HOBART WELDERS

TM-944C October 2003

Handler 135 (500 414) Eff. w/Serial No. LB096205

Handler 175 (500 416) Eff. w/Serial No. LB075197

Processes

MIG (GMAW) Welding

Flux Cored (FCAW) Welding

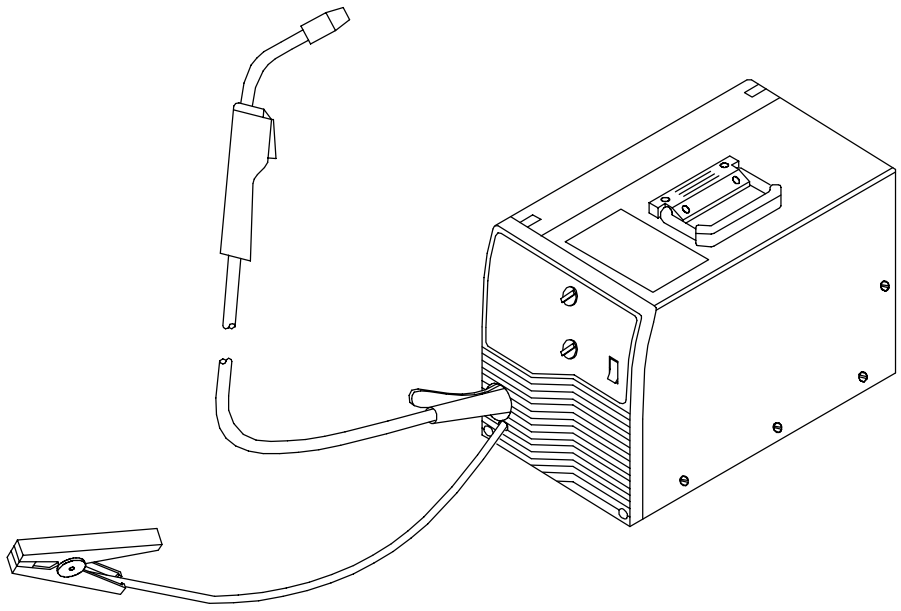
Description

CV DC 1 Phase

Arc Welding Power Source And Wire Feeder

Handler 135 / 175

And H-10 Gun



TECHNICAL MANUAL

Visit our website at

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TABLE OF CONTENTS

SECTION 1 − SAFETY PRECAUTIONS FOR SERVICING 1
1-1. Symbol Usage 1
1-2. Servicing Hazards 1
1-3. California Proposition 65 Warnings 2
1-4. EMF Information 2
SECTION 2 − SPECIFICATIONS 3
2-1. Specifications 3
2-2. Duty Cycle And Overheating 4
2-3. Volt-Ampere Curves 5
SECTION 3 − INSTALLATION 6
3-1. Installing Welding Gun 6
3-2. Installing Work Clamp 6
3-3. Process/Polarity Table 7
3-4. Changing Polarity 7
3-5. Installing Gas Supply 8
3-6. Selecting A Location And Connecting Input Power For 115 VAC Model 9
3-7. Selecting A Location And Connecting Input Power For 230 VAC Model 10
3-8. Electrical Service Guide For 230 VAC Model 11
3-9. Installing Wire Spool And Adjusting Hub Tension 11
3-10. Threading Welding Wire 12
SECTION 4 − OPERATION 13
4-1. Controls 13
4-2. Weld Parameter Chart For 115 VAC Model 14
4-3. Weld Parameter Chart For 230 VAC Model 16
SECTION 5 − THEORY OF OPERATION 18
SECTION 6 − TROUBLESHOOTING 20
6-1. Troubleshooting Table 20
6-2. Troubleshooting Circuit Diagram For Welding Power Source (115 VAC Model) 22
6-3. Troubleshooting Circuit Diagram For Welding Power Source (230 VAC Model) 24
6-4. Control Board PC1 Testing Information (115 VAC Model) 26
6-5. Control Board PC1 Test Point Values (115 VAC Model) 27
6-6. Control Board PC1 Testing Information (230 VAC Model) 28
6-7. Control Board PC1 Test Point Values (230 VAC Model) 29
SECTION 7 − MAINTENANCE &TROUBLESHOOTING 30
7-1. Routine Maintenance 30
7-2. Overload Protection 30
7-3. Drive Motor Protection 30
7-4. Changing Drive Roll Or Wire Inlet Guide 31
7-5. Replacing Gun Contact Tip 31
7-6. Cleaning Or Replacing Gun Liner 32
7-7. Replacing Switch And/Or Head Tube 33
SECTION 8 − ELECTRICAL DIAGRAMS 34
SECTION 9 − PARTS LIST 42

SECTION 1 − SAFETY PRECAUTIONS FOR SERVICING

1-1. Symbol Usage

safety_stm 5/97

Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ *Means "Note"; not safety related.*

This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Servicing Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard.**

▲ **Only qualified persons should service, test, maintain, and repair this unit.**

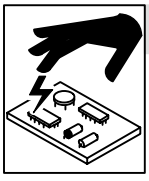
▲ **During servicing, keep everybody, especially children, away.**

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Turn Off welding power source and wire feeder and disconnect and lockout input power using line disconnect switch, circuit breakers, or by removing plug from receptacle, or stop engine before servicing unless the procedure specifically requires an energized unit.
- Insulate yourself from ground by standing or working on dry insulating mats big enough to prevent contact with the ground.
- Do not leave live unit unattended.
- If this procedure requires an energized unit, have only personnel familiar with and following standard safety practices do the job.
- When testing a live unit, use the one-hand method. Do not put both hands inside unit. Keep one hand free.
- Disconnect input power conductors from deenergized supply line BEFORE moving a welding power source.

SIGNIFICANT DC VOLTAGE exists after removal of input power on inverters.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any parts.

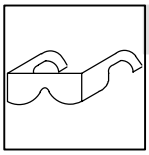


STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.

FIRE OR EXPLOSION hazard.

- Do not place unit on, over, or near combustible surfaces.
- Do not service unit near flammables.

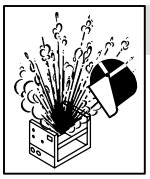


FLYING METAL can injure eyes.

- Wear safety glasses with side shields or face shield during servicing.
- Be careful not to short metal tools, parts, or wires together during testing and servicing.

HOT PARTS can cause severe burns.

- Do not touch hot parts bare handed.
- Allow cooling period before working on welding gun or torch.



EXPLODING PARTS can cause injury.

- Failed parts can explode or cause other parts to explode when power is applied to inverters.
- Always wear a face shield and long sleeves when servicing inverters.

SHOCK HAZARD from testing.

- Turn Off welding power source and wire feeder or stop engine before making or changing meter lead connections.
- Use at least one meter lead that has a self-retaining spring clip such as an alligator clip.
- Read instructions for test equipment.

FALLING UNIT can cause injury.

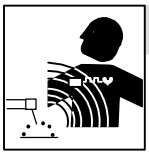
- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.

MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.

MOVING PARTS can cause injury.

- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.

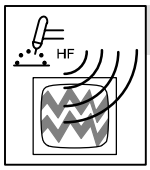


MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away from servicing areas until consulting your doctor.

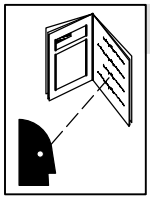
OVERUSE can cause OVERHEATING.

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment install, test, and service H.F. producing units.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



READ INSTRUCTIONS.

- Use MILLER Testing Booklet (Part No. 150 853) when servicing this unit.
- Consult the Owner's Manual for welding safety precautions.
- Use only genuine MILLER replacement parts.

1-3. California Proposition 65 Warnings

▲ **Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)**

▲ **Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.**

For Gasoline Engines:

▲ **Engine exhaust contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.**

For Diesel Engines:

▲ **Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.**

1-4. EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: "The body of evidence, in the committee's judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard." However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Pacemakers:

Pacemaker wearers consult your doctor first. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 − SPECIFICATIONS

2-1. Specifications

A. 115 VAC Model

Rated Welding Output	Amperage Range	Maximum Open-Circuit Voltage DC	Amperes Input at Rated Load Output 115 V, 60 Hz, Single-Phase	KVA	KW	Weight W/ Gun	Overall Dimensions
90 A @ 19 Volts DC, 20% Duty Cycle 63 A @ 21 Volts DC, 20% Duty Cycle*	30 − 135	28	20 15*	2.90 2.20*	2.50 1.77*	55 lb (25 kg)	Length: 18-7/8 in (479 mm) Width: 10-5/8 in (270 mm) Height: 12-3/8 in (314 mm)
Wire Type And Dia	**Solid/ Stainless**	**Flux Cored/ Aluminum**	**Wire Feed Speed Range**				
	.024 − .030 in (0.6 − 0.8 mm)	.030 − .035 in (0.8 − 0.9 mm)/ .030 (0.8 mm)	370 − 840 IPM (9.2 − 21.8 m/min) At No Load 50 − 800 IPM (1.3 − 20.3 m/min) Feeding Wire				
*** CSA Rating**							

B. 230 VAC Model

Rated Welding Output	Amperage Range	Maximum Open-Circuit Voltage DC	Amperes Input at Rated Load Output 230 V, 50/60 Hz, Single-Phase	KVA	KW	Weight W/ Gun	Overall Dimensions
130 A @ 20 Volts DC, 30% Duty Cycle At 60 Hz Input − 20% Duty Cycle At 50 Hz Input	30 − 175	30	19.5	4.60	3.75	65 lb (29.5 kg)	Length: 18-7/8 in (479 mm) Width: 10-5/8 in (270 mm) Height: 12-3/8 in (314 mm)
Wire Type And Dia	**Solid/ Stainless**	**Flux Cored/ Aluminum**	**Wire Feed Speed Range**				
	.024 − .035 in (0.6 − 0.9 mm)	.030 − .045 in (0.8 − 1.2 mm)/ .030 − .035 in (0.8 − 0.9 mm)	350 − 900 IPM (9.0 − 23.0 m/min) At No Load 50 − 850 IPM (1.3 − 20.3 m/min) Feeding Wire				

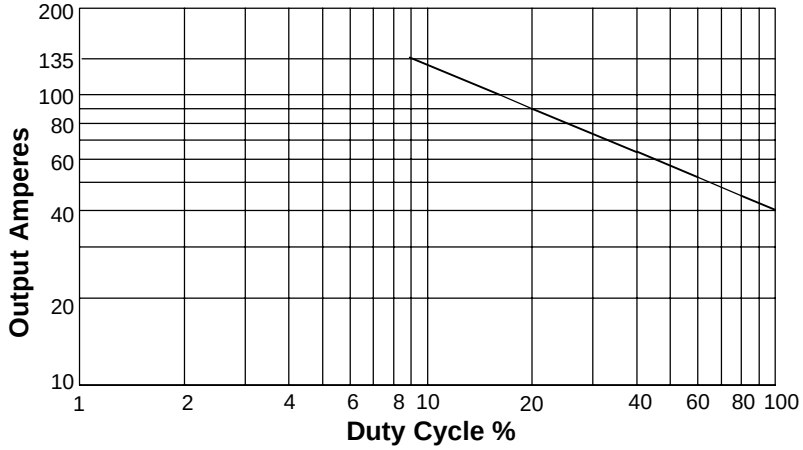
2-2. Duty Cycle And Overheating

Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

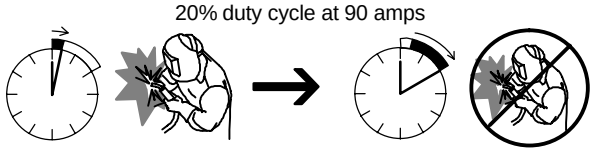
If unit overheats, thermostat(s) opens, output stops, and cooling fan runs. Wait fifteen minutes for unit to cool. Reduce amperage or duty cycle before welding.

▲ **Exceeding duty cycle can damage unit or gun and void warranty.**

C. 115 VAC Model

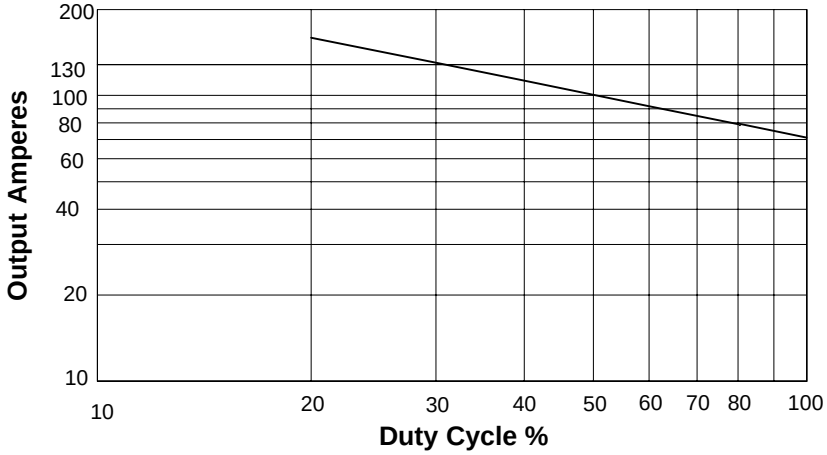


20% duty cycle at 90 amps

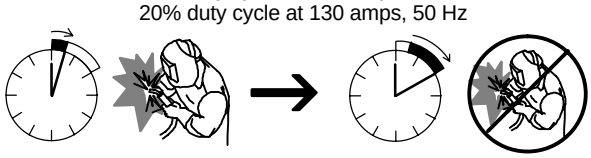


2 Minutes Welding — 8 Minutes Resting

D. 230 VAC Model

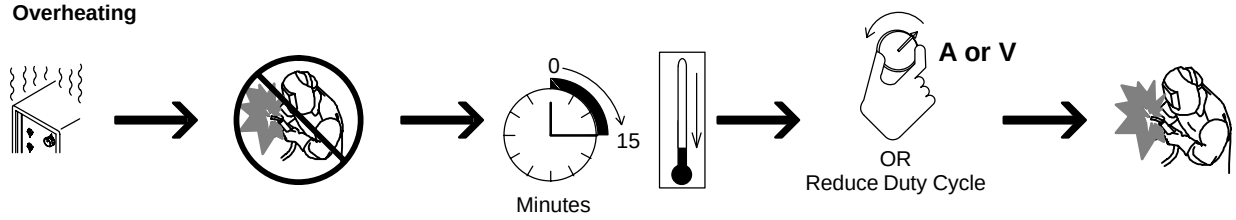


30% duty cycle at 130 amps, 60 Hz
20% duty cycle at 130 amps, 50 Hz



3 Minutes Welding — 7 Minutes Resting

Overheating

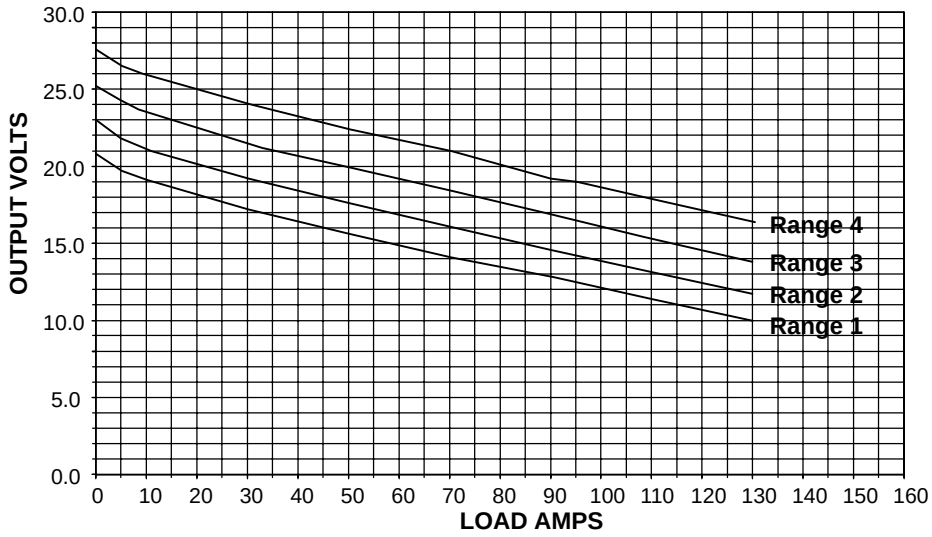


duty1 4/95 – 196 617 / 196 618

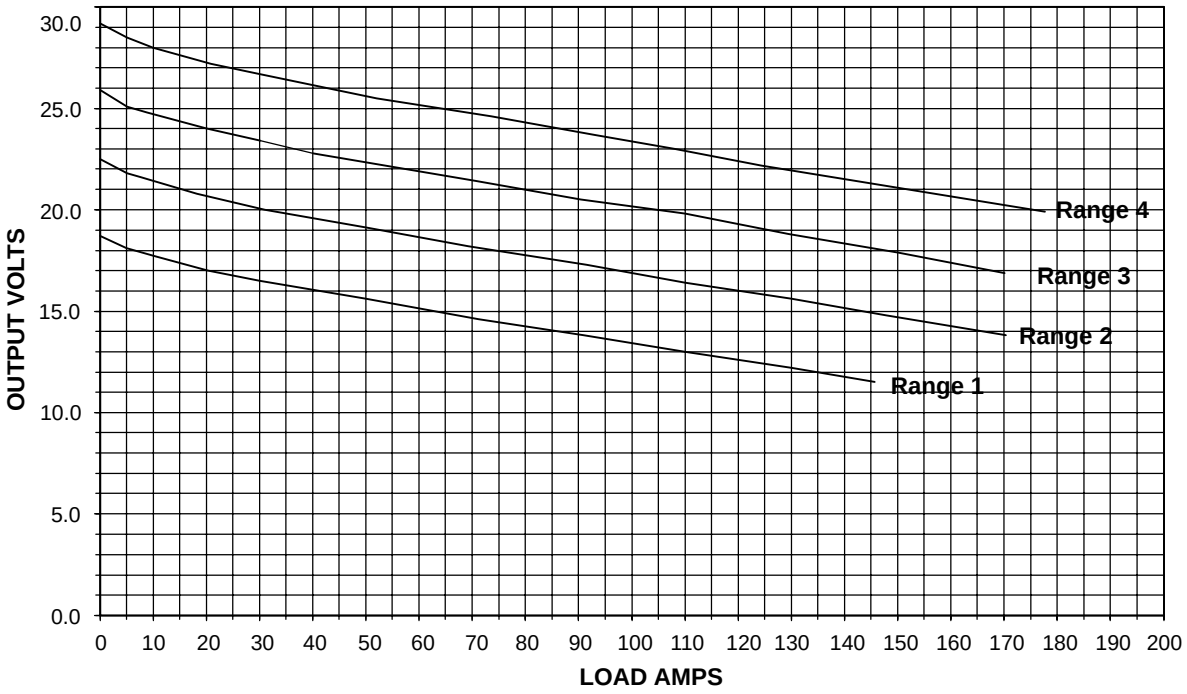
2-3. Volt-Ampere Curves

E. 115 VAC Model

The volt-ampere curves show the minimum and maximum voltage and amperage output capabilities of the welding power source. Curves of other settings fall between the curves shown.



F. 230 VAC Model



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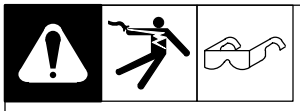
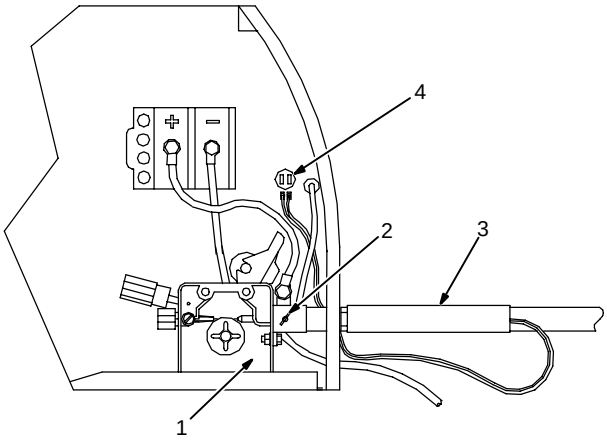
SECTION 3 − INSTALLATION

3-1. Installing Welding Gun





1 Drive Assembly

2 Gun Securing Thumbscrew

3 Gun End

Loosen thumbscrew. Insert gun end through opening until it bottoms against drive assembly. Tighten thumbscrew.

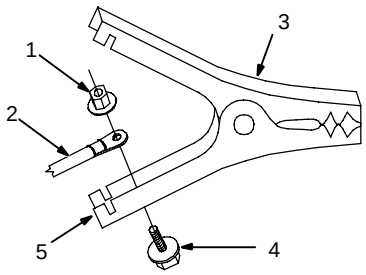
4 Gun Trigger Leads

Insert leads, one at a time, through gun opening on front panel. Connect female friction terminals to matching male terminals in unit. Polarity is not important.

Close door.

Ref. 802 440-A

3-2. Installing Work Clamp



1 Nut

2 Work Cable From Unit

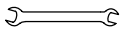
3 Work Clamp

4 Screw

5 Work Clamp Tabs

Bend tabs around work cable.

Tools Needed:



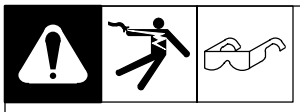
3/8, 7/16 in

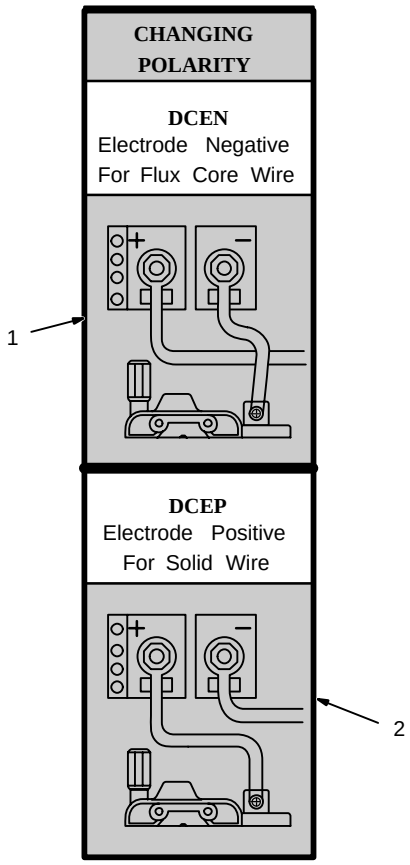
802 456

3-3. Process/Polarity Table

Process	Polarity	Cable Connections	
		Cable To Gun	Cable To Work
GMAW − Solid wire with shielding gas	DCEP − Reverse polarity	Connect to positive (+) output terminal	Connect to negative (−) output terminal
FCAW − Self-shielding wire − no shielding gas	DCEN − Straight Polarity	Connect to negative (−) output terminal	Connect to positive (+) output terminal

3-4. Changing Polarity





1 Lead Connections For Direct Current Electrode Negative (DCEN)

2 Lead Connections For Direct Current Electrode Positive (DCEP)

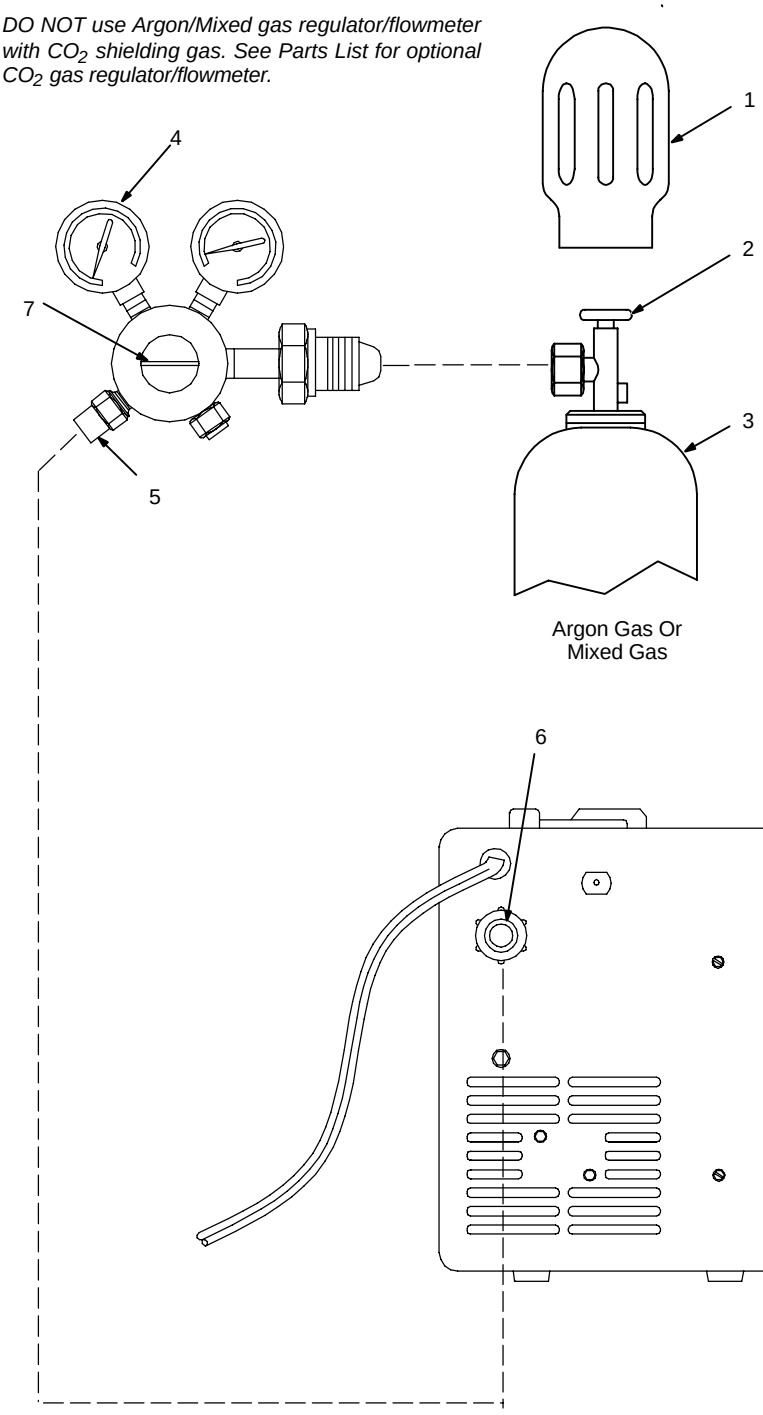
Always read and follow wire manufacturer's recommended polarity, and see Section 3-3.

Close door.

Ref. 209 228 / Ref. 209 229

3-5. Installing Gas Supply

☞ *DO NOT use Argon/Mixed gas regulator/flowmeter with CO_2 shielding gas. See Parts List for optional CO_2 gas regulator/flowmeter.*



Obtain gas cylinder and chain to running gear, wall, or other stationary support so cylinder cannot fall and break off valve.

1 Cap

2 Cylinder Valve

Remove cap, stand to side of valve, and open valve slightly. Gas flow blows dust and dirt from valve. Close valve.

3 Cylinder

4 Regulator/Flowmeter

Install so face is vertical.

5 Regulator/Flowmeter Gas Hose Connection

6 Welding Power Source Gas Hose Connection

Connect customer supplied gas hose between regulator/flowmeter gas hose connection, and fitting on rear of welding power source.

7 Flow Adjust

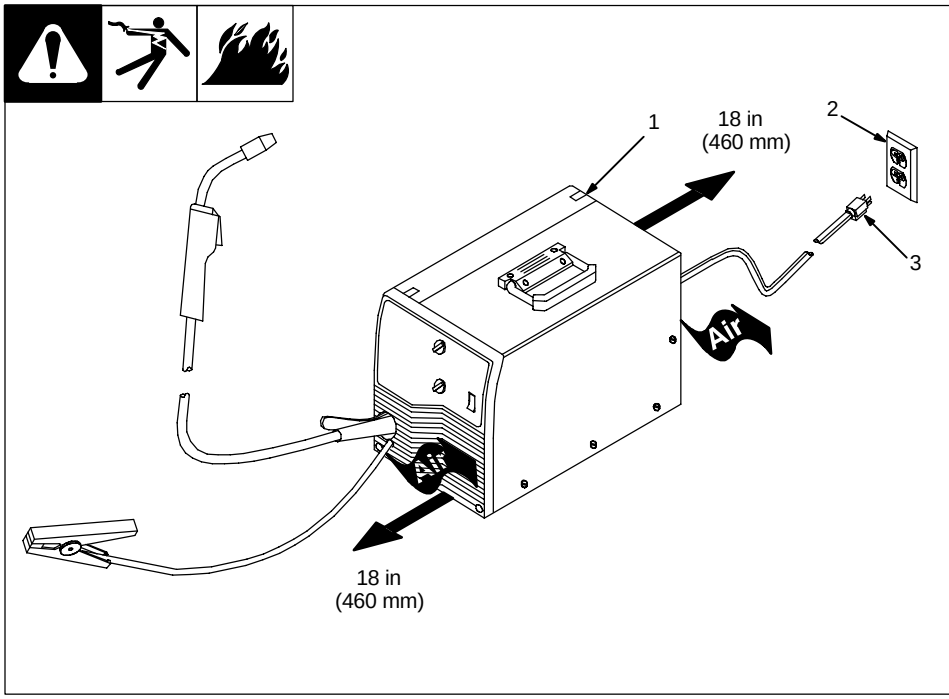
Typical flow rate is 20 cfh (cubic feet per hour). Check wire manufacturer's recommended flow rate.

Tools Needed:

5/8, 1-1/8 in

Ref. 802 028-A / 802 441

3-6. Selecting A Location And Connecting Input Power For 115 VAC Model



1 Rating Label

2 Grounded Receptacle

A 115 volt, 20 ampere individual branch circuit protected by time-delay fuses or circuit breaker is required.

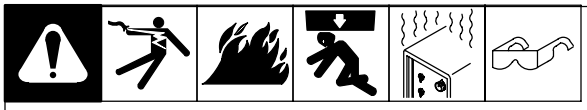
3 Plug From Unit

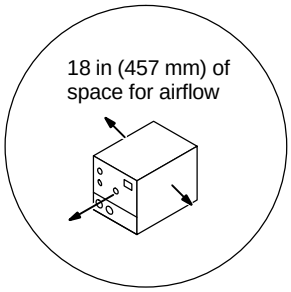
Select extension cord of 14 AWG for up to 50 ft (15 m) or 12 AWG for 50 up to 200 ft (61 m).

▲ **Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.**

802 442-A

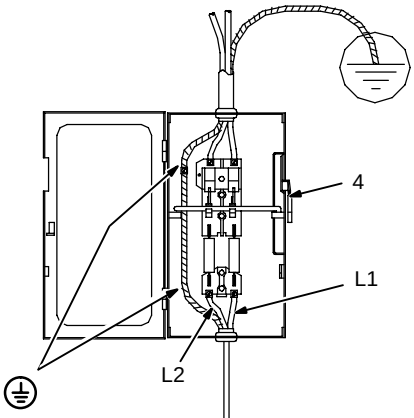
3-7. Selecting A Location And Connecting Input Power For 230 VAC Model

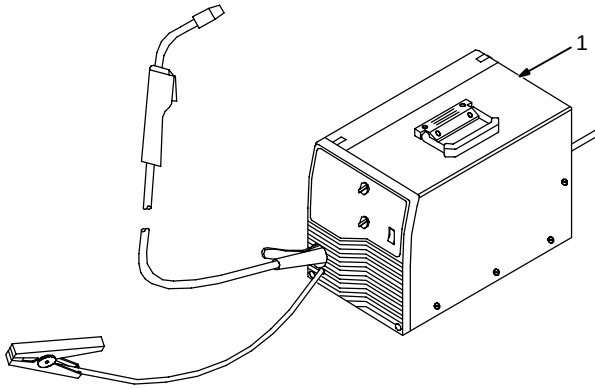


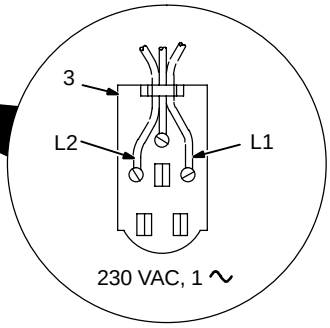


▲ **Always connect grounding conductor first.**

⏚ **= GND/PE**







1 Rating Label

Supply correct input power.

2 Plug (NEMA 6-50P)

3 Receptacle (NEMA 6-50R)

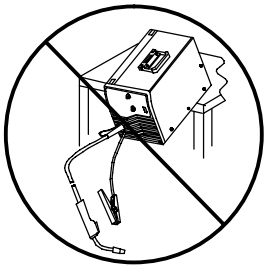
Connect plug to receptacle.

4 Line Disconnect Device

See Section 3-8.

▲ **Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.**

▲ **Do not move or operate unit where it could tip.**



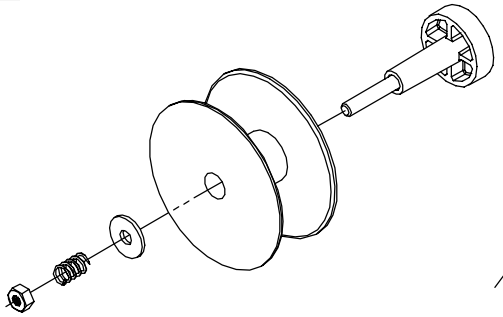
ssb2.2* 1/94 – 802 443-A / Ref. 802 085

3-8. Electrical Service Guide For 230 VAC Model

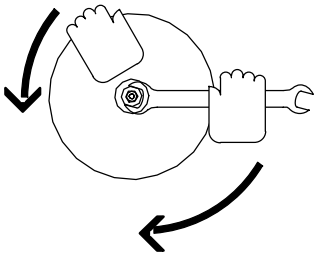
Input Voltage	230
Input Amperes At Rated Output	20
Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes	20
Min Input Conductor Size In AWG/Kcmil	14
Max Recommended Input Conductor Length In Feet (Meters)	66 (20)
Min Grounding Conductor Size In AWG/Kcmil	12
Reference: 1996 National Electrical Code (NEC)	S-0092-J

3-9. Installing Wire Spool And Adjusting Hub Tension

Installing 4 in (102 mm) Wire Spool

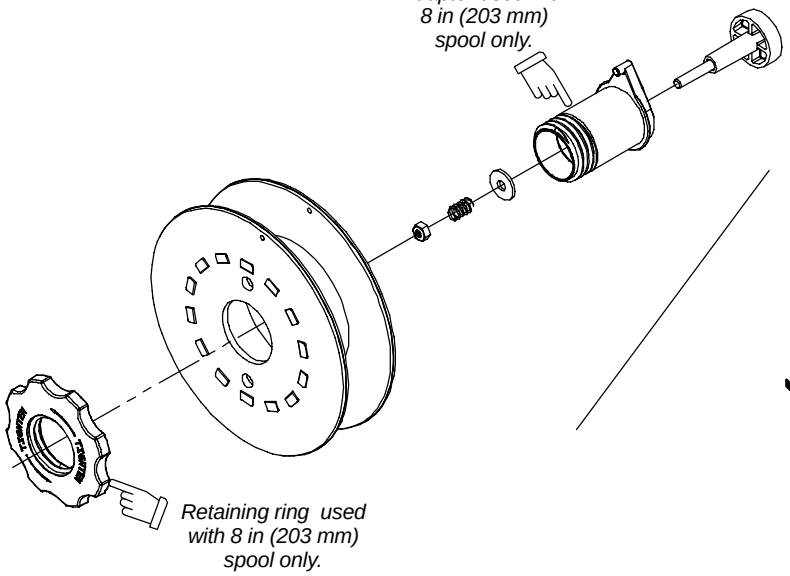


When a slight force is needed to turn spool, tension is set.



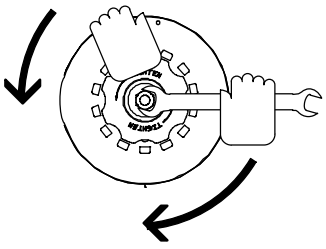
Installing 8 in (203 mm) Wire Spool

Adapter used with 8 in (203 mm) spool only.



Retaining ring used with 8 in (203 mm) spool only.

When a slight force is needed to turn spool, tension is set.



Tools Needed:

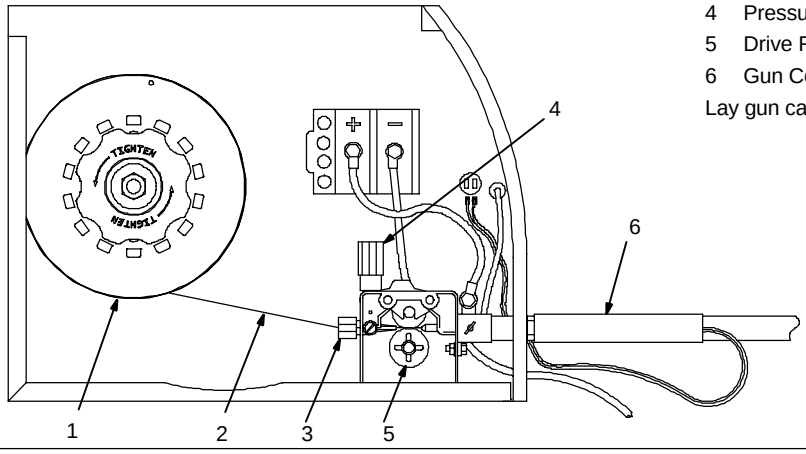
1/2 in

803 012 / 803 013-B / Ref. 802 971-C

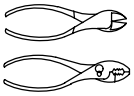
3-10. Threading Welding Wire

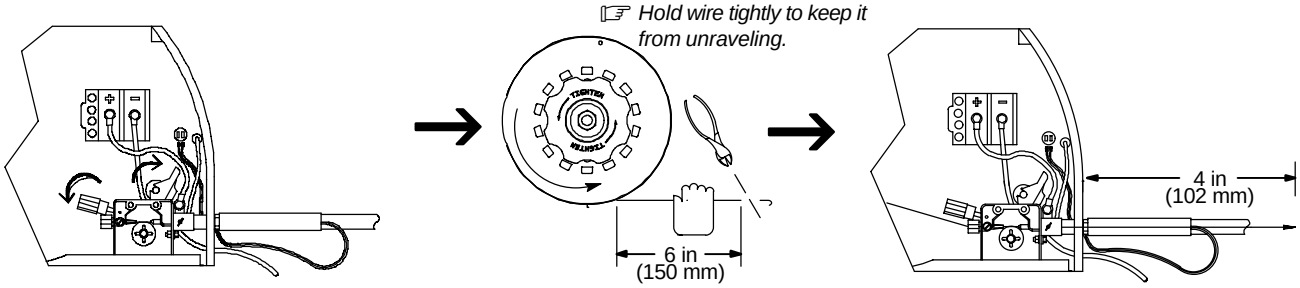
1 Wire Spool
2 Welding Wire
3 Inlet Wire Guide
4 Pressure Adjustment Knob
5 Drive Roll
6 Gun Conduit Cable

Lay gun cable out straight.



Tools Needed:

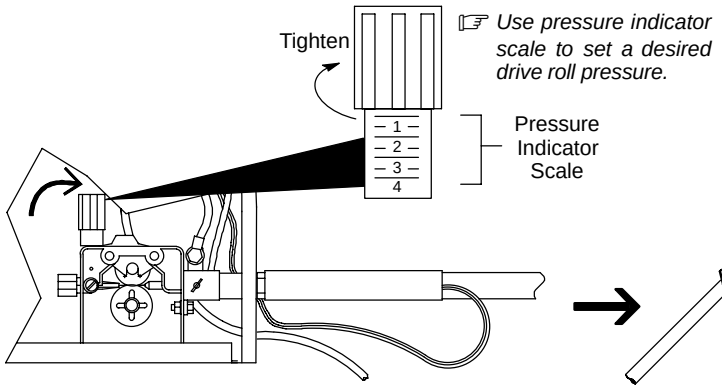


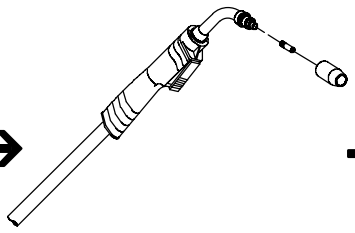


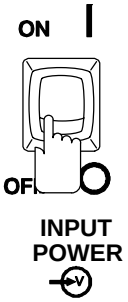
Open pressure assembly.

Pull and hold wire; cut off end.

Push wire thru guides into gun; continue to hold wire.



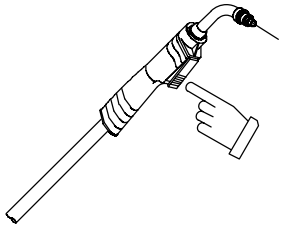


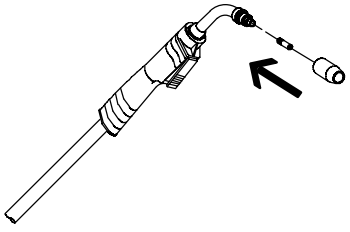


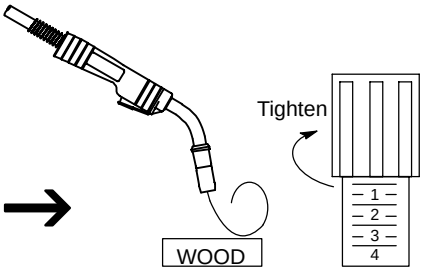
Be sure that wire is positioned in proper feed roll groove. Close and tighten pressure assembly, and let go of wire.

Remove gun nozzle and contact tip.

Turn power on.







Press gun trigger until wire comes out of gun.

Be sure that tip matches wire diameter. Reinstall contact tip and nozzle.

Feed wire to check drive roll pressure. Tighten knob enough to prevent slipping. Cut off wire. Close door.

Ref. 802 444-C

SECTION 4 – OPERATION

4-1. Controls

1 Voltage Switch

The higher the selected number, the thicker the material that can be welded (see weld setting label in welding power source or Sections 4-2 and 4-3, as applicable). Do not switch under load.

☞ *Switch must "click" into detent position 1, 2, 3, 4, or purge for proper contact.*

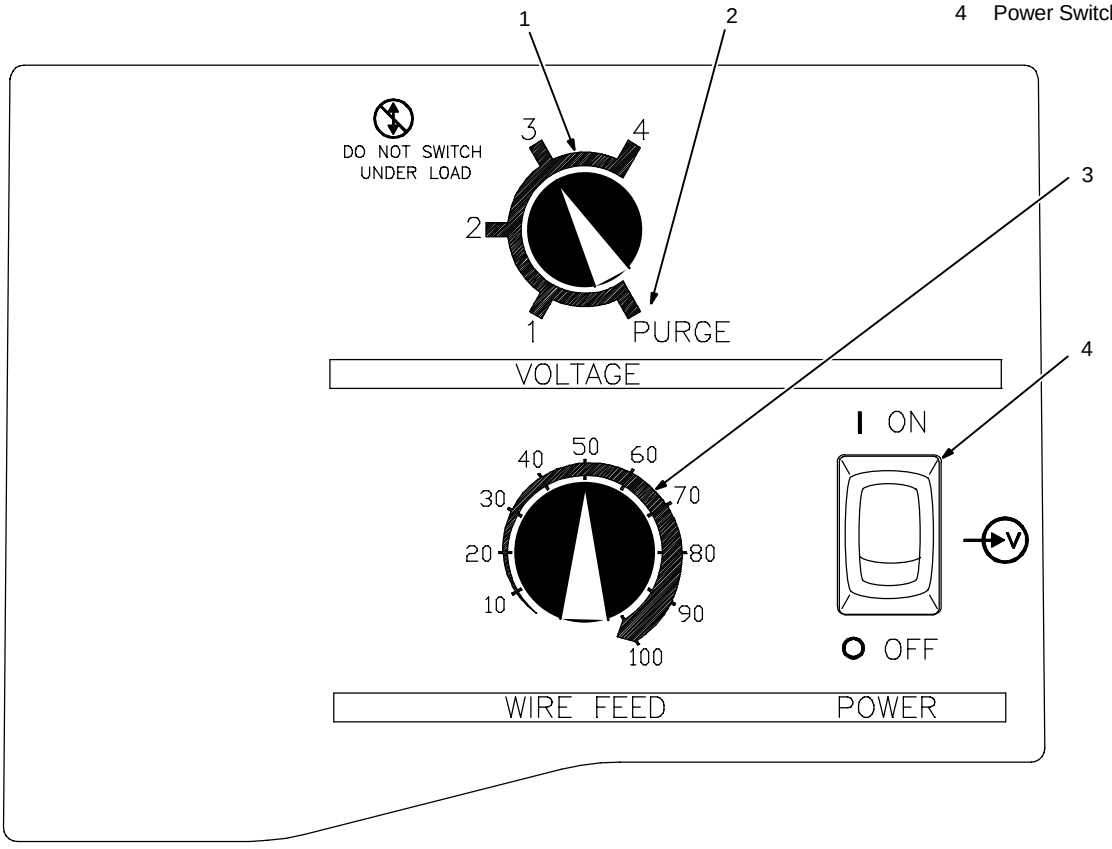
2 Voltage Switch - Purge "0" Position

In purge position, fan runs but there is no weld output.

3 Wire Speed Control

Use control to select a wire feed speed. As Voltage switch setting increases, wire speed range also increases (see weld setting label in welding power source or Sections 4-2 or 4-3, as applicable).

4 Power Switch



Ref. 196 082

4-2. Weld Parameter Chart For 115 VAC Model

Welding Guide

Settings are approximate. Adjust as required. Thicker materials can be welded using proper technique, joint preparation, and multiple passes.

Material Being Welded	Wire Type, and Polarity Setting	Suggested Shielding Gas 20−30 cfh Flow Rate	Diameter of Wire Being Used
Steel	Flux Core E71T −11 (DCEN)	**No Shielding Gas Required** Good for Windy or Outdoor Applications	.030" (0.8 mm)
			.035" (0.9 mm)
	Solid Wire ER70S−6 (DCEP)	**C25 Gas Mixture** 75% Argon / 25% CO2 Produces less Spatter Better Appearance	.024" (0.6 mm)
			.030" (0.8 mm)
	Solid Wire ER70S−6 (DCEP)	**100% CO2**	.024" (0.6 mm)
			.030" (0.8 mm)
Stainless Steel	Stainless Steel (DCEP)	**Tri−Mix** 90% He/7.5% Ar/2.5% CO2	.024" (0.6 mm)
			.030" (0.8 mm)
Aluminum	Aluminum** (DCEP)	**100% Argon****	.030" (0.8 mm)

Match feedroll groove to diameter of wire being used.
Set Tension Knob Setting to 3 at Start.
Adjust tension per instructions in the manual.

CAUTION!
Do not change Voltage Switch Knob position while welding.

**Aluminum wire is relatively soft so feedability is not as good. Make sure that hub tension is not too tight and

for 115 Volt Wire Welding Package

Recommended Voltage and Wire Speed Settings for Thickness of Metal Being Welded.
Number on Left of Slash is Voltage Setting / Number on Right of Slash is Wire Feed Setting.

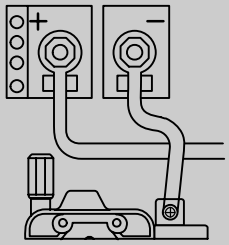
22 gauge (.8 mm)	18 gauge (1.2 mm)	16 gauge (1.6 mm)	1/8 inch (3.2 mm)	3/16 inch (4.8 mm)
---	1/10	1/20	3/30	4/40
---	---	1/10	3/10	4/30
1/10	1/20	2/30	4/65	---
---	2/10	3/30	4/50	---
---	2/10	2/15	4/40	---
---	3/10	4/10	4/20	---
---	2/30	3/40	4/50	---
---	2/15	3/10	4/30	---
---	---	---	4/90**	---

Wire Speed listed is a starting value only - Wire Speed setting can be fine−tuned while welding. Wire Speed also depends on other variables such as stick out, travel speed, weld angle, cleanliness of metal, etc.

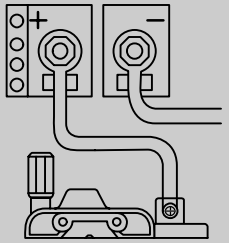
keep torch as straight as possible. A ”push angle” for the torch is normally recommended.

CHANGING POLARITY

DCEN
Electrode Negative
For Flux Core Wire



DCEP
Electrode Positive
For Solid Wire



4-3. Weld Parameter Chart For 230 VAC Model

Welding Guide

Settings are approximate. Adjust as required. Thicker materials can be welded using proper technique, joint preparation, and multiple passes.

Material Being Welded	Wire Type, and Polarity Setting	Suggested Shielding Gas 20−30 cfh Flow Rate	Diameter of Wire Being Used
Steel	Flux Core E71T −11 (DCEN)	**No Shielding Gas Required** Good for Windy or Outdoor Applications	.030" (0.8 mm) .035" (0.9 mm) .045" (1.2 mm)
	Solid Wire ER70S−6 (DCEP)	**C25 Gas Mixture** 75% Argon / 25% CO2 Produces less Spatter Better Appearance	.024" (0.6 mm) .030" (0.8 mm) .035" (0.9 mm)
	Solid Wire ER70S−6 (DCEP)	**100% CO2**	.024" (0.6 mm) .030" (0.8 mm) .035" (0.9 mm)
Stainless Steel	Stainless Steel (DCEP)	**Tri−Mix** 90% He/7.5% Ar/2.5% CO2	.024" (0.6 mm) .030" (0.8 mm) .035" (0.9 mm)
Aluminum	Aluminum** (DCEP)	**100% Argon****	.030" (0.8 mm) .035" (0.9 mm)

Match feedroll groove to diameter of wire being used.
Set Tension Knob Setting to 3 at Start.
Adjust tension per instructions in the manual.

CAUTION!
Do not change Voltage Switch Knob position while welding.

**Aluminum wire is relatively soft so feedability is not as good. Make sure that hub tension is not too tight and

for 230 Volt Wire Welding Package

Recommended Voltage and Wire Speed Settings for Thickness of Metal Being Welded.
Number on Left of Slash is Voltage Setting / Number on Right of Slash is Wire Feed Setting.

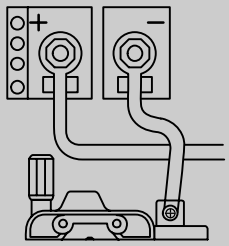
22 gauge (.8 mm)	18 gauge (1.2 mm)	16 gauge (1.6 mm)	1/8 inch (3.2 mm)	3/16 inch (4.8 mm)	1/4 inch (6.4 mm)
---	1/10	1/30	3/50	3/60	4/80
---	---	1/20	3/40	3/50	4/60
---	---	---	2/20	3/40	4/50
1/20	1/45	2/85	3/90	4/100	---
1/10	1/30	2/40	3/80	4/85	4/100
---	1/20	2/30	3/75	3/80	4/70
1/10	2/30	2/35	3/70	4/85	---
---	2/20	2/30	3/65	4/40	4/50
---	2/10	2/20	3/40	4/30	4/40
---	2/20	2/40	3/50	4/90	---
---	2/10	2/20	2/40	4/80	---
---	---	2/10	2/30	4/70	---
---	---	1/100**	4/100**	---	---
---	---	1/95**	4/90**	---	---

Wire Speed listed is a starting value only - Wire Speed setting can be fine−tuned while welding. Wire Speed also depends on other variables such as stick out, travel speed, weld angle, cleanliness of metal, etc.

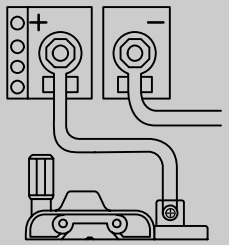
keep torch as straight as possible. A "push angle" for the torch is normally recommended.

CHANGING POLARITY

DCEN
Electrode Negative
For Flux Core Wire



DCEP
Electrode Positive
For Solid Wire



SECTION 5 − THEORY OF OPERATION

1 Circuit Breaker CB1

Protects unit from an over-current condition by opening primary power line.

2 Power Switch S1

Turns unit and fan motor FM on and off.

3 Fan Motor FM And Transformer

Controlled by power switch S1. Fan cools internal components, and transformer supplies control voltage to PC1.

4 Thermostat TP1

If unit overheats, TP1 opens stopping all weld output.

5 Gun Trigger Receptacle RC3

Connects gun trigger circuit to welding power source.

6 Control Board PC1

Controls weld output by connecting primary power to main transformer T1 through a board-mounted contactor that is activated by pressing the gun trigger. PC1 also regulates wire feed motor speed with a motor control circuit. Speed is set by feedback from Wire Feed Speed Control R1.

7 Gas Valve GS1

Controls shielding gas flow. Pressing gun trigger opens valve.

8 Wire Speed Control R1

Controls wire feed motor speed by providing a reference voltage to motor control circuit on PC1.

9 Range Switch S2

Allows selection of weld output voltage.

10 Main Transformer T1

Supplies power to weld output circuit.

11 Main Rectifier SR1

Changes the ac output from T1 to full-wave rectified dc output.

12 Output Capacitor C1

Smooths dc weld voltage from main rectifier SR1.

13 Stabilizer L1

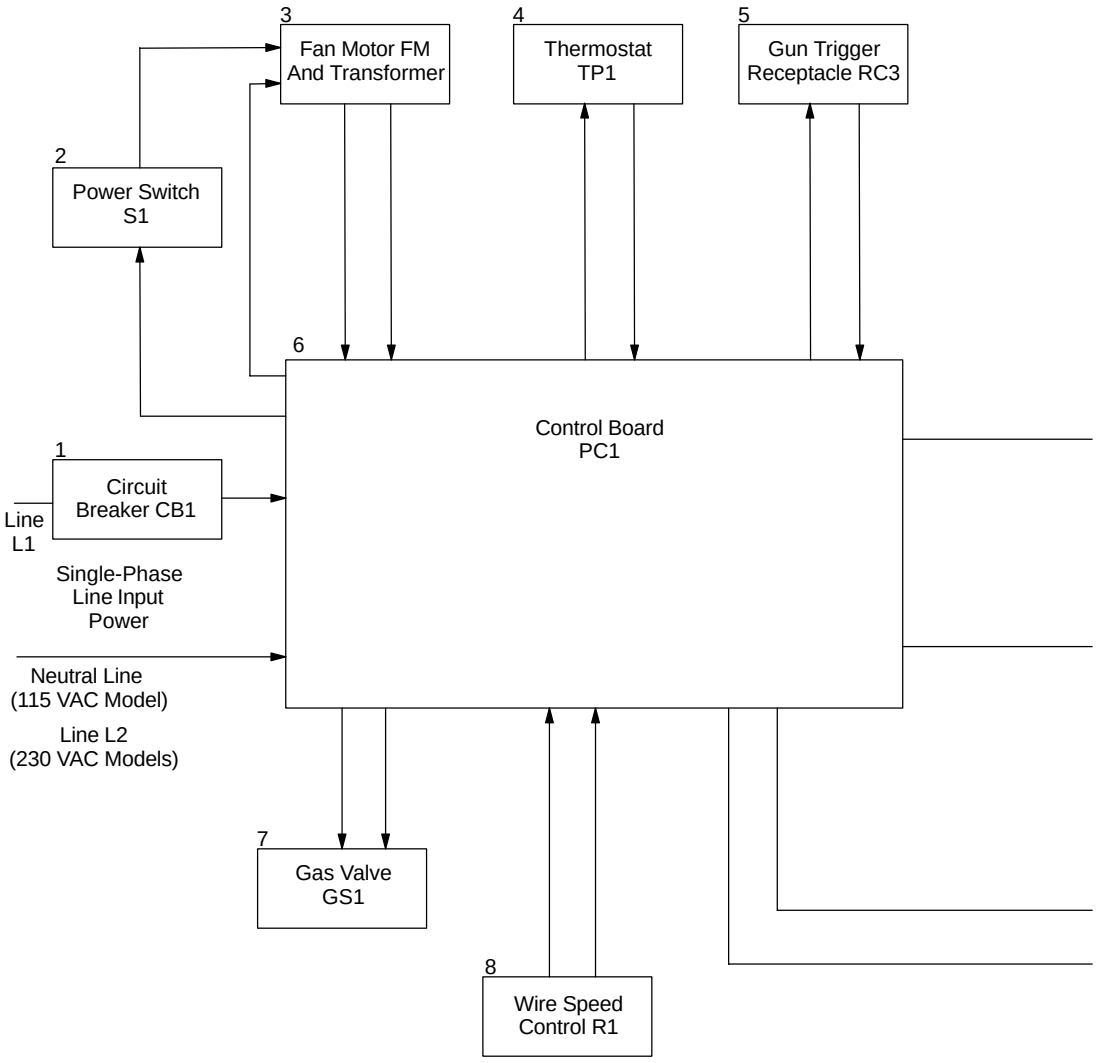
Smooths dc weld current from main rectifier SR1.

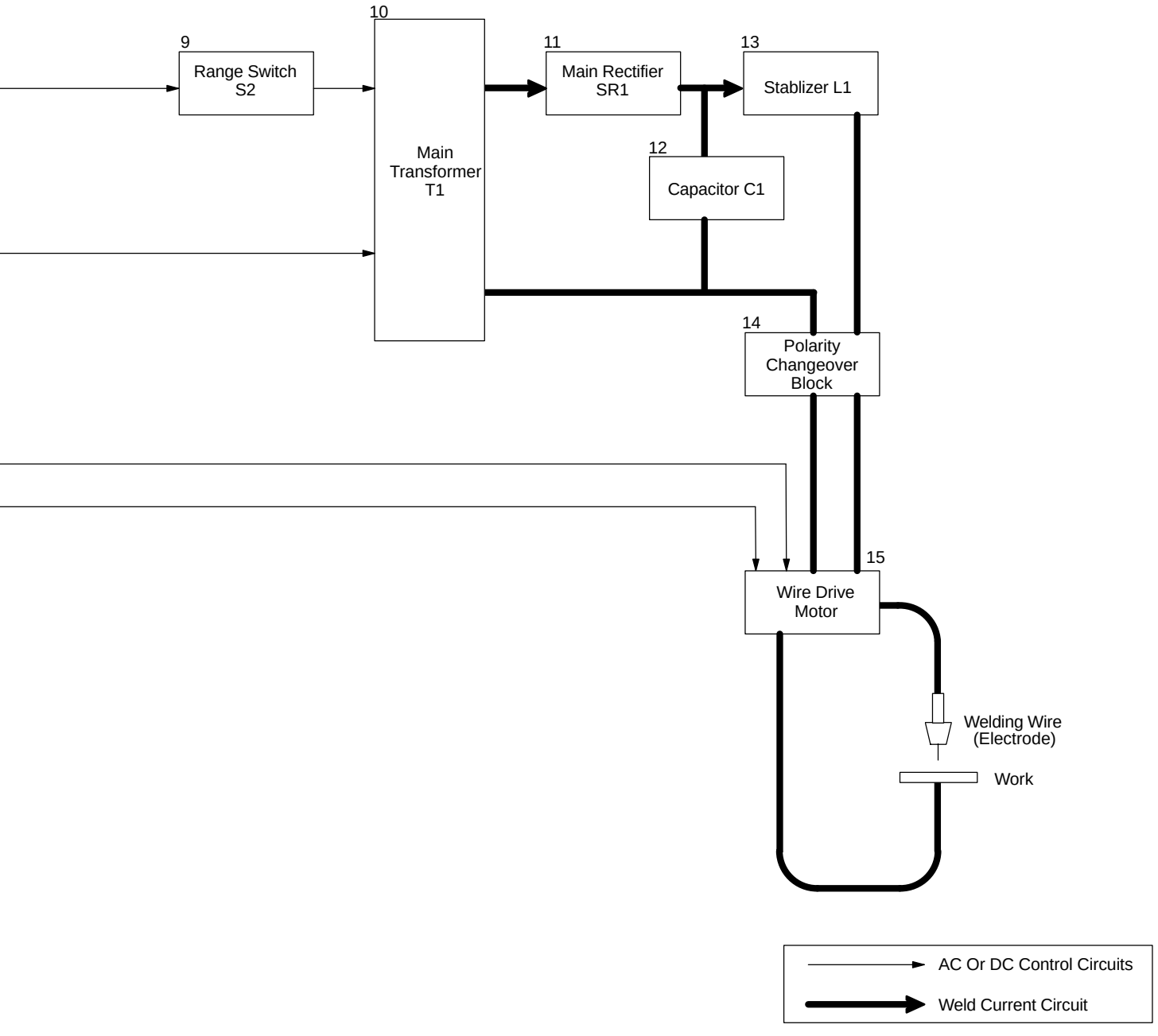
14 Polarity Changeover Block

Terminals allow changing between DCEP and DCEN processes.

15 Wire Drive Motor

Feeds wire at a speed set by R1. Pressing gun trigger activates wire drive motor.




9
Range Switch
S2
10
Main
Transformer
T1
11
Main Rectifier
SR1
13
Stablizer L1
12
Capacitor C1
14
Polarity
Changeover
Block
15
Wire Drive
Motor
Welding Wire
(Electrode)
Work
AC Or DC Control Circuits
Weld Current Circuit

SECTION 6 − TROUBLESHOOTING

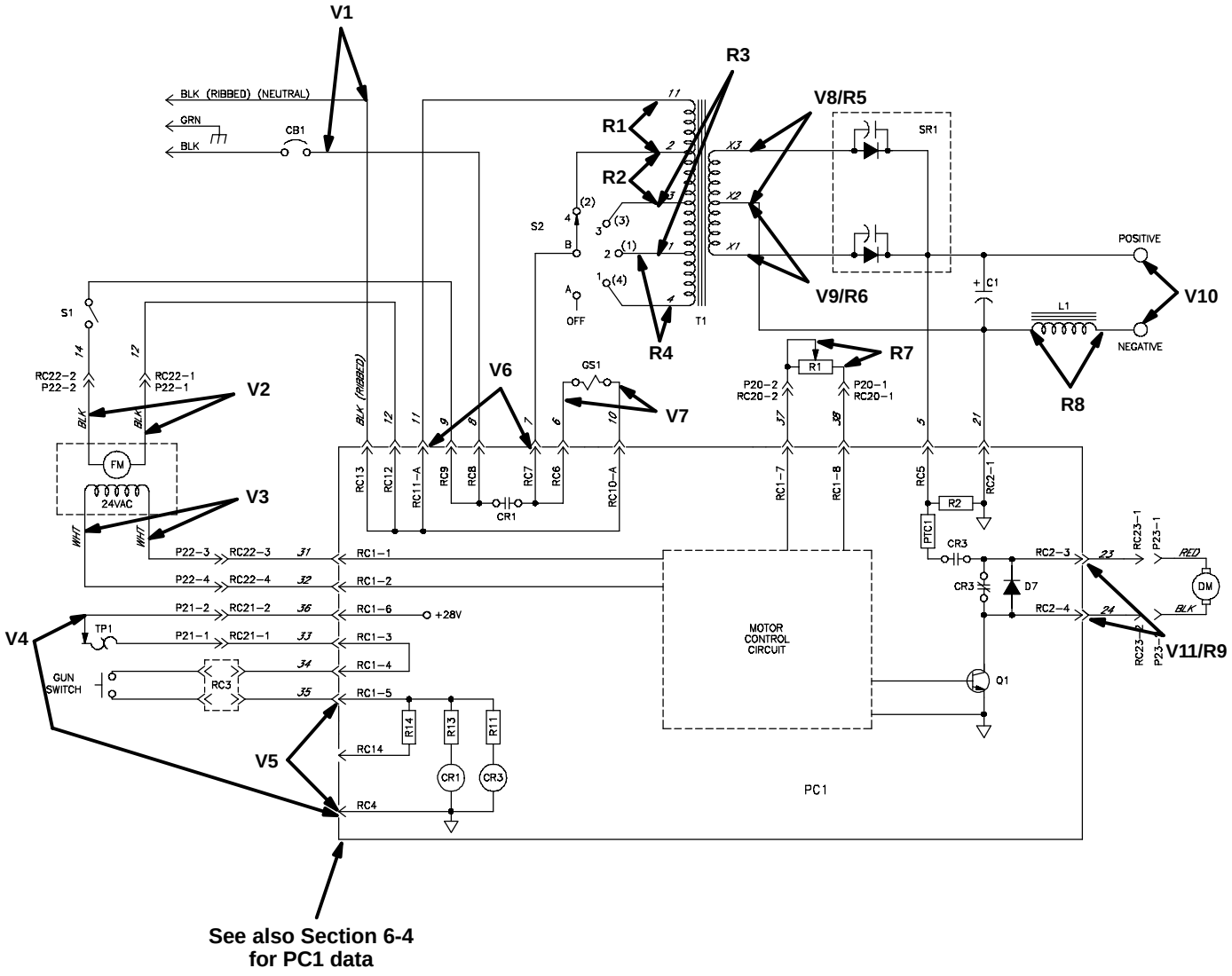
6-1. Troubleshooting Table

☞ *See Section 6-2 or 6-3 for test points and values and Section 9 for parts location.*

Trouble	Remedy
No weld output; wire does not feed; fan does not run.	Secure power cord plug PLG1 in receptacle (see Section 3-6 or 3-7).
	Replace building line fuse or reset circuit breaker if open.
	Place Power switch S1 in On position (see Section 4-1).
	Reset power source circuit breaker if open (see Section 7-2).
No weld output; wire does not feed; fan runs.	Rotate Voltage switch S2 out of the Purge (gas only) position.
	Thermostat TP1 open (overheating). Allow fan to run; the thermostat will close when the unit has cooled (see Section 7-3).
	Secure gun trigger leads to receptacle RC3 (see Section 3-1).
	Check continuity of gun trigger leads. Repair or replace gun if necessary.
	Check Wire Speed control R1 for proper connections and resistance; R1 is 55k ohms ±20%. Replace R1 if necessary.
	Check continuity of Voltage switch S2, and replace if necessary.
	Check diodes in main rectifier SR1, and replace if necessary.
	Check main transformer T1 for signs of winding failure. Check continuity across windings and check for proper connections. Check secondary voltages. Replace T1 if necessary.
	Check control board PC1 connections and voltages, and replace if necessary.
	Check the setting of Voltage switch S2. Machine will not weld if voltage control is set between range positions. Rotate switch until it “clicks” into a detent position.
Electrode wire feeding stops during welding.	Straighten gun cable and/or replace damaged parts (see Section 7-6).
	Readjust drive roll pressure (see Section 3-10).
	Change to proper groove (see Section 7-4).
	Readjust wire reel hub tension (see Section 3-9).
	Replace contact tip if blocked (see Section 7-5).
	Clean or replace wire inlet guide or liner if dirty or plugged (see Section 7-4 and/or 7-6).
	Replace drive roll or pressure bearing if worn or slipping (see Section 7-4).
	Secure gun trigger leads in receptacle RC3 (see Section 3-1).
	Check continuity of gun trigger leads. Repair or replace gun if necessary.
	Check and clear any restrictions at drive assembly and liner (see Section 3-10 and/or 7-6).
	Release gun trigger and allow gun and motor protection circuitry to reset.
	Check T1 for signs of winding failure. Check continuity across each winding and check for proper connections. Check secondary voltages. Replace T1 if necessary.
	Check Control board PC1 and connections, and replace PC1 if necessary (see Section 6-4).

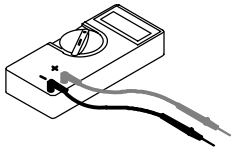
Trouble	Remedy
No weld output; wire feeds.	Connect work clamp to get good metal-to-metal contact.
	Replace gun contact tip (see Section 7-5).
	Check thumbscrew securing gun end to feedhead adapter and tighten if necessary.
Low weld output.	Connect unit to proper input voltage or check for low line voltage.
	Place Voltage switch S2 in desired position (see Section 4-1).
Low or erratic wire speed.	Readjust weld parameter settings.
	Change to correct size drive roll.
	Readjust drive roll pressure.
	Clean or replace wire inlet guide or liner if dirty or plugged (see Section 7-4 and/or 7-6).
	Readjust wire reel hub tension.
	Check voltage and connections of wire drive motor. Replace motor if necessary.
Improper or no shielding gas flow.	Clean or replace gas hose.
	Check shielding gas valve GS1 for proper coil voltage and connections. Check continuity of coil. Replace GS1 if necessary.
	Clear blockage in gun.

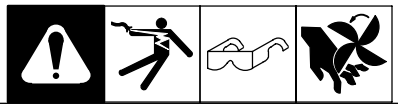
6-2. Troubleshooting Circuit Diagram For Welding Power Source (115 VAC Model)



See also Section 6-4 for PC1 data

Test Equipment Needed:





Voltage Readings	
a)	**Tolerance − ±10 % unless specified**
b)	**Wiring Diagram − see Section 8**
V1	115 volts ac with power cord plugged in
V2	115 volts ac with Power switch S1 On
V3	24 volts ac with Power switch S1 On
V4	30 volts dc with Power switch S1 On
V5	27 volts dc with gun trigger pressed
V6	115 volts ac with gun trigger pressed
V7	115 volts ac with gun trigger pressed
V8, V9	15.5 volts ac with Voltage switch S2 in position 1
	17.0 volts ac with Voltage switch S2 in position 2
	18.5 volts ac with Voltage switch S2 in position 3
	20.5 volts ac with Voltage switch S2 in position 4
V10	20.5 volts dc with Voltage switch S2 in position 1
	22.5 volts dc with Voltage switch S2 in position 2
	25.0 volts dc with Voltage switch S2 in position 3
	27.5 volts dc with Voltage switch S2 in position 4
V11	12 to 19 volts dc from min. to max. of Wire Speed control R1 with Voltage switch S2 in position 1
	13 to 21 volts dc from min. to max. of Wire Speed control R1 with Voltage switch S2 in position 2
	15 to 23 volts dc from min. to max. of Wire Speed control R1 with Voltage switch S2 in position 3
	17 to 26 volts dc from min. to max. of Wire Speed control R1 with Voltage switch S2 in position 4

Resistance Values	
a)	**Tolerance − ±10% unless specified**
b)	**Turn Off unit and disconnect input power before checking resistance**
R1-R6	All values for T1 are less than 1 ohm
R7	Less than 1 ohm at minimum position of Wire Speed control R1; 55k ohms at maximum position of Wire Speed control R1
R8	Less than 1 ohm
R9	Less than 2 ohms with wire feed motor disconnected from circuit

Wire Speed And Drive Motor RPM Feeding Wire*

Wire Diameter And Type	Voltage Switch S2 Position	Min. RPM	Max. RPM	Min. IPM	Max. IPM
.030/.035 Solid or Flux Core	1	50	155	190	585
	2	60	170	230	640
	3	70	190	265	715
	4	80	215	300	800

*All tests done with .030-.035 liner in H-10 model 10 foot welding gun, smooth groove drive roll.

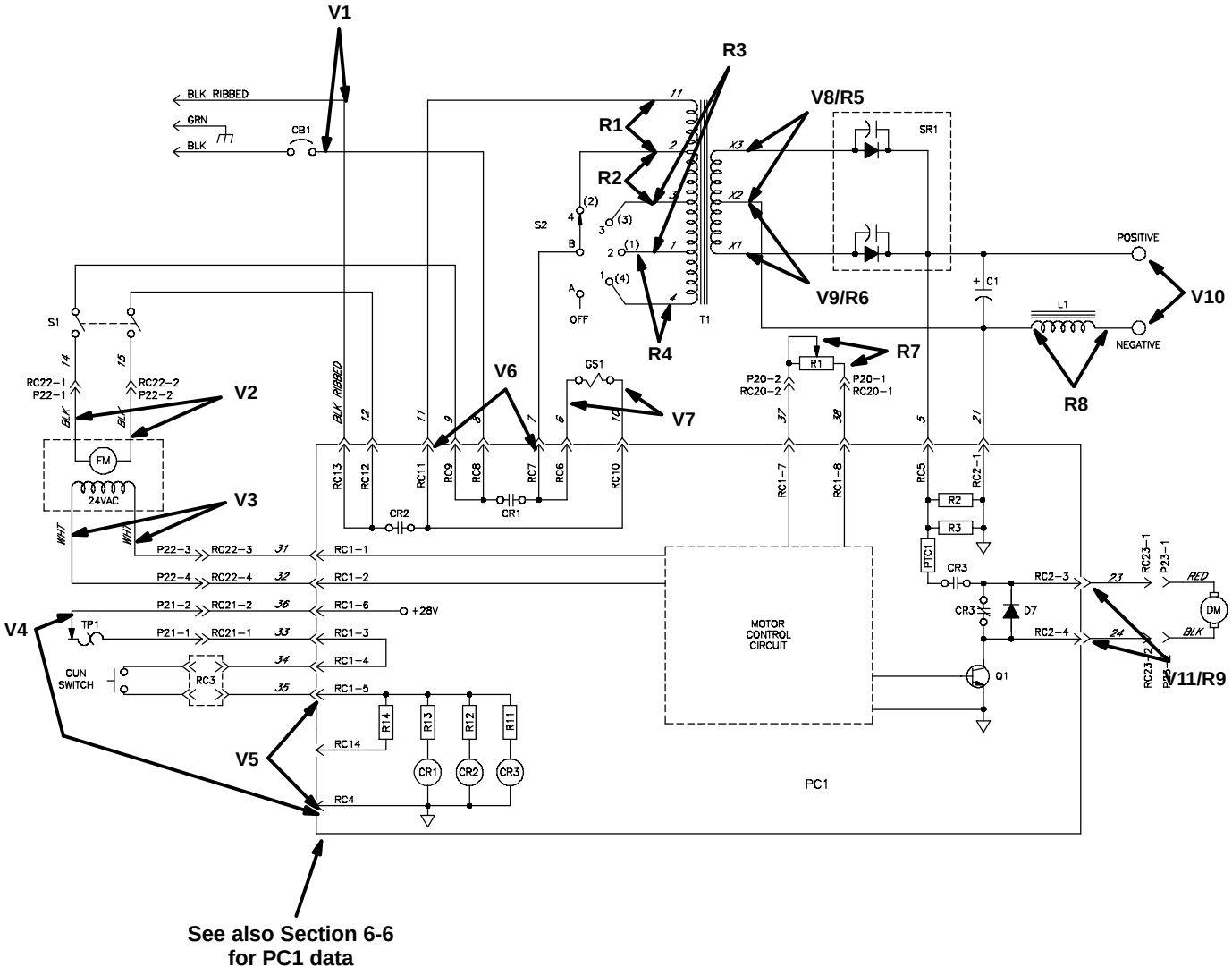
Values are nominal depending on drive roll pressure and spool hub tension.

Drive Motor RPM At No Load*

Voltage Switch S2 Position	Min. RPM	Max. RPM
1	95	170
2	110	180
3	125	200
4	140	225

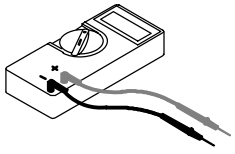
*All tests done with the pressure assembly open, not feeding wire. Values are nominal.

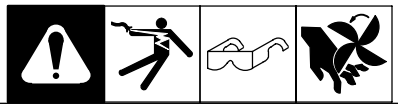
6-3. Troubleshooting Circuit Diagram For Welding Power Source (230 VAC Model)



See also Section 6-6 for PC1 data

Test Equipment Needed:





Voltage Readings	
a)	**Tolerance − ±10 % unless specified**
b)	**Wiring Diagram − see Section 8**
V1	230 volts ac with power cord plugged in
V2	230 volts ac with Power switch S1 On
V3	24 volts ac with Power switch S1 On
V4	30 volts dc with Power switch S1 On
V5	27 volts dc with gun trigger pressed
V6	230 volts ac with gun trigger pressed
V7	230 volts ac with gun trigger pressed
V8, V9	13.9 volts ac with Voltage switch S2 in position 1
	16.5 volts ac with Voltage switch S2 in position 2
	19.1 volts ac with Voltage switch S2 in position 3
	21.7 volts ac with Voltage switch S2 in position 4
V10	18.9 volts dc with Voltage switch S2 in position 1
	22.6 volts dc with Voltage switch S2 in position 2
	25.1 volts dc with Voltage switch S2 in position 3
	29.8 volts dc with Voltage switch S2 in position 4
V11	7.0 to 17.5 volts dc from min. to max. of Wire Speed control R1 with Voltage switch S2 in position 1
	10.0 to 20.5 volts dc from min. to max. of Wire Speed control R1 with Voltage switch S2 in position 2
	12.7 to 24.0 volts dc from min. to max. of Wire Speed control R1 with Voltage switch S2 in position 3
	15.5 to 27.0 volts dc from min. to max. of Wire Speed control R1 with Voltage switch S2 in position 4

Resistance Values	
a)	**Tolerance − ±10% unless specified**
b)	**Turn Off unit and disconnect input power before checking resistance**
R1-R6	All values for T1 are less than 1 ohm
R7	Less than 1 ohm at minimum position of Wire Speed control R1; 55k ohms at maximum position of Wire Speed control R1
R8	Less than 1 ohm
R9	Less than 2 ohms with wire feed motor disconnected from circuit

Wire Speed And Drive Motor RPM Feeding Wire*

Wire Diameter And Type	Voltage Switch S2 Position	Min. RPM	Max. RPM	Min. IPM	Max. IPM
.030/.035 Solid or Flux Core	1	40	135	150	510
	2	50	160	190	600
	3	70	190	260	700
	4	90	205	340	800

*All tests done with .030-.035 liner in H-10 model 10 foot welding gun, smooth groove drive roll.

Values are nominal depending on drive roll pressure and spool hub tension.

Drive Motor RPM At No Load*

Voltage Switch S2 Position	Min. RPM	Max. RPM
1	80	150
2	110	175
3	135	200
4	160	235

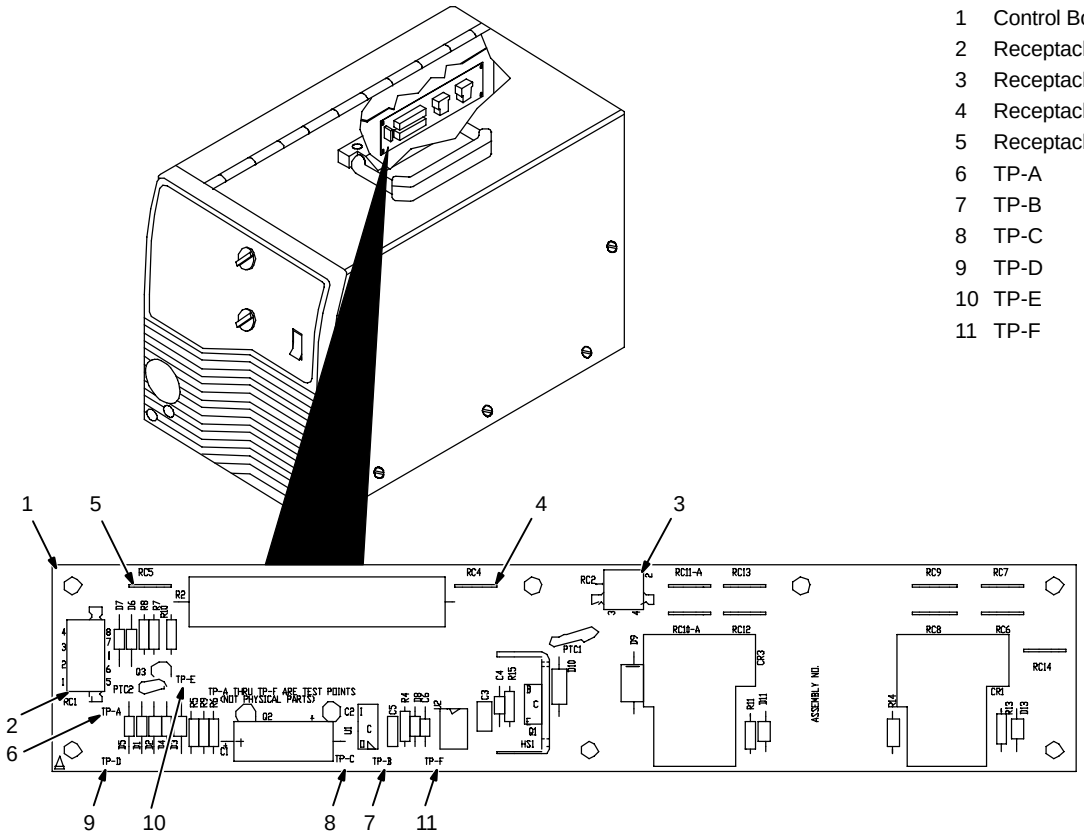
*All tests done with the pressure assembly open, not feeding wire. Values are nominal.

194 325-A

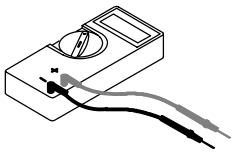
6-4. Control Board PC1 Testing Information (115 VAC Model)

Be sure plugs are secure before testing. See Section 6-5 for specific values during testing.

1 Control Board PC1
2 Receptacle RC1
3 Receptacle RC2
4 Receptacle RC4
5 Receptacle RC5
6 TP-A
7 TP-B
8 TP-C
9 TP-D
10 TP-E
11 TP-F

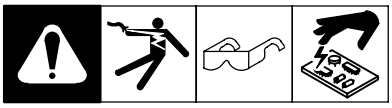


Test Equipment Needed:



802 779 / 195 888-B

6-5. Control Board PC1 Test Point Values (115 VAC Model)



PC1 Voltage Readings

a) Tolerance − ±10% unless specified

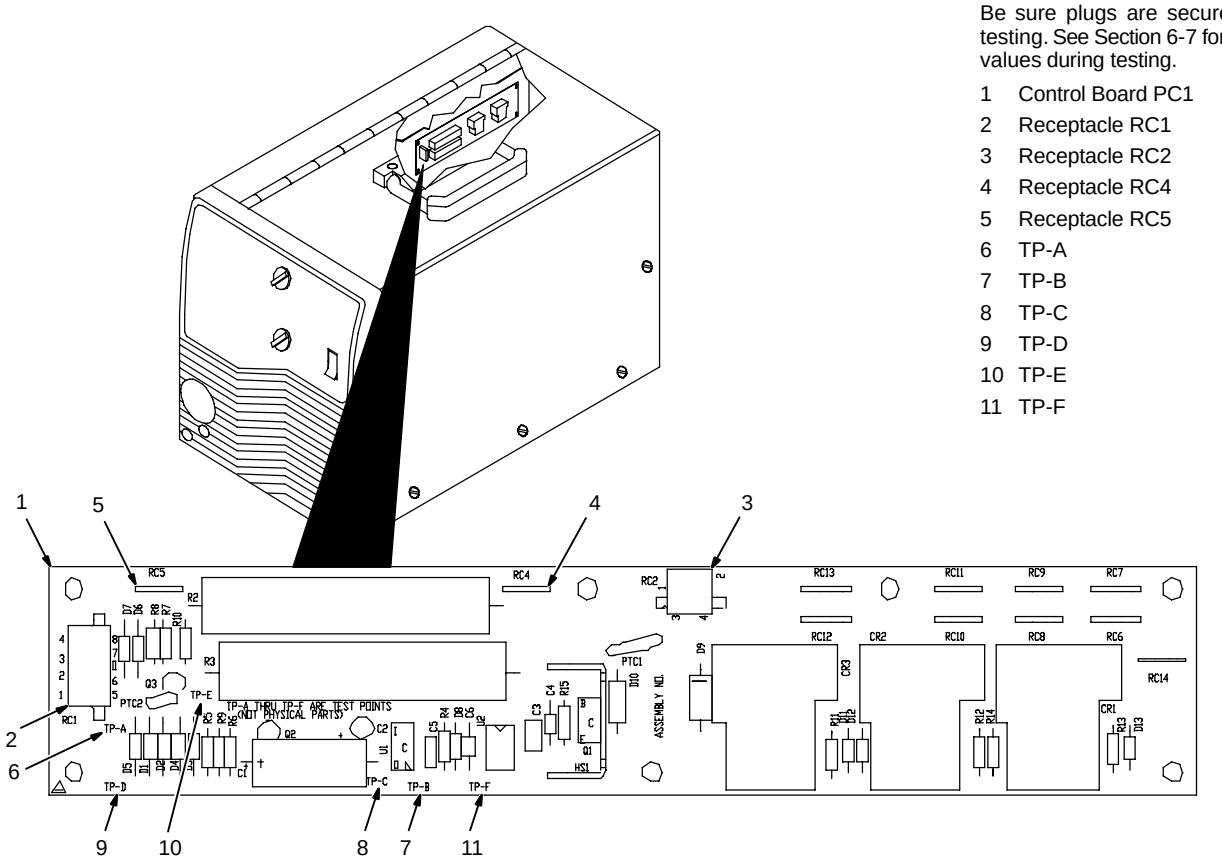
b) Reference − to circuit common unless noted

Voltage Readings:

a) Tolerance − ±10% unless specified **b) Reference − as noted**

Receptacle	Pin	Value
RC1	1	24 volts ac input, reference to pin RC1-2
	2	24 volts ac input, reference to pin RC1-1
	3,4	35 volts dc with transformer thermostat closed, reference to pin TP-C
	5	35 volts dc with gun trigger closed, reference to TP-C
	6	35 volts dc, reference to TP-C
	7	15.0 volts dc, reference to TP-C
	8	15.0 to 6.5 volts dc from min to max of Wire Feed speed control R1, Reference for TP-C
RC2	1	Negative (−) welder output voltage
	2	Not used
	3	Positive (+) output to wire drive motor
	4	Negative (−) output to wire drive motor
RC4	−−	Circuit common
RC5	−−	Positive (+) welder output voltage with gun trigger closed
TP	A	35 volts dc, reference to TP-C
TP	B	15 volts dc, reference to TP-C
TP	C	Circuit common
TP	D	30 volts dc, reference to TP-C
TP	E	15 volts dc with Wire Speed control R1 at minimum, reference to TP-C
TP	F	11 volts dc with Wire Speed control R1 at maximum, reference to TP-C

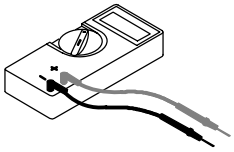
6-6. Control Board PC1 Testing Information (230 VAC Model)



Be sure plugs are secure before testing. See Section 6-7 for specific values during testing.

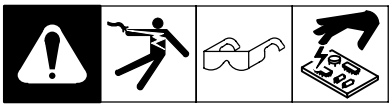
1 Control Board PC1
2 Receptacle RC1
3 Receptacle RC2
4 Receptacle RC4
5 Receptacle RC5
6 TP-A
7 TP-B
8 TP-C
9 TP-D
10 TP-E
11 TP-F

Test Equipment Needed:



802 779 / 195 889-B

6-7. Control Board PC1 Test Point Values (230 VAC Model)



PC1 Voltage Readings

a) Tolerance − ±10% unless specified

b) Reference − to circuit common unless noted

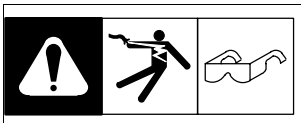
Voltage Readings:

a) Tolerance − ±10% unless specified **b) Reference − as noted**

Receptacle	Pin	Value
RC1	1	24 volts ac input, reference to pin RC1-2
	2	24 volts ac input, reference to pin RC1-1
	3,4	35 volts dc with transformer thermostat closed, reference to pin TP-C
	5	35 volts dc with gun trigger closed, reference to TP-C
	6	35 volts dc, reference to TP-C
	7	15.0 volts dc, reference to TP-C
	8	15.0 to 6.5 volts dc from min to max of Wire Feed speed control R1, Reference for TP-C
RC2	1	Negative (−) welder output voltage
	2	Not used
	3	Positive (+) output to wire drive motor
	4	Negative (−) output to wire drive motor
RC4	−−	Circuit common
RC5	−−	Positive (+) welder output voltage with gun trigger closed
TP	A	35 volts dc, reference to TP-C
TP	B	15 volts dc, reference to TP-C
TP	C	Circuit common
TP	D	30 volts dc, reference to TP-C
TP	E	15 volts dc with Wire Speed control R1 at minimum, reference to TP-C
TP	F	11 volts dc with Wire Speed control R1 at maximum, reference to TP-C

SECTION 7 − MAINTENANCE

7-1. Routine Maintenance

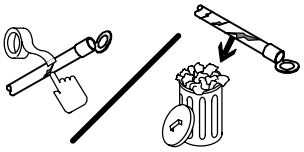


▲ **Disconnect power before maintaining.**

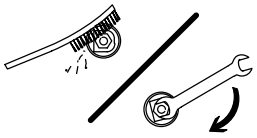
3 Months

Replace unreadable labels.

Repair or replace cracked weld cable.

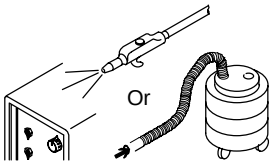


Clean and tighten weld terminals.



6 Months

Blow out or vacuum inside. During heavy service, clean monthly.

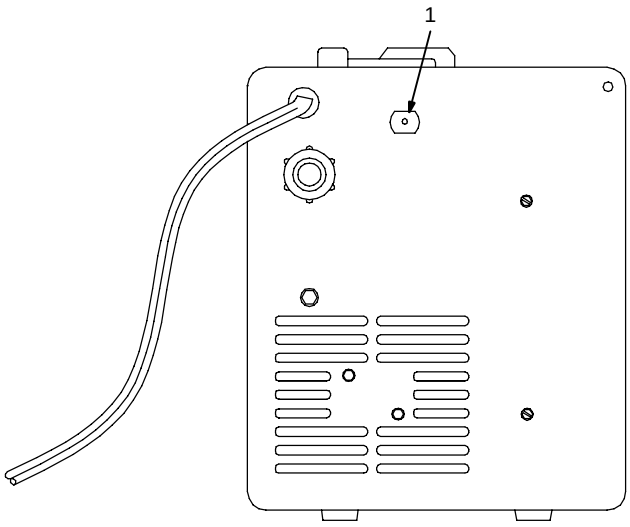


7-2. Overload Protection

1 Circuit Breaker CB1

CB1 protects unit from overload. If CB1 opens, unit shuts down.

Reset breaker.

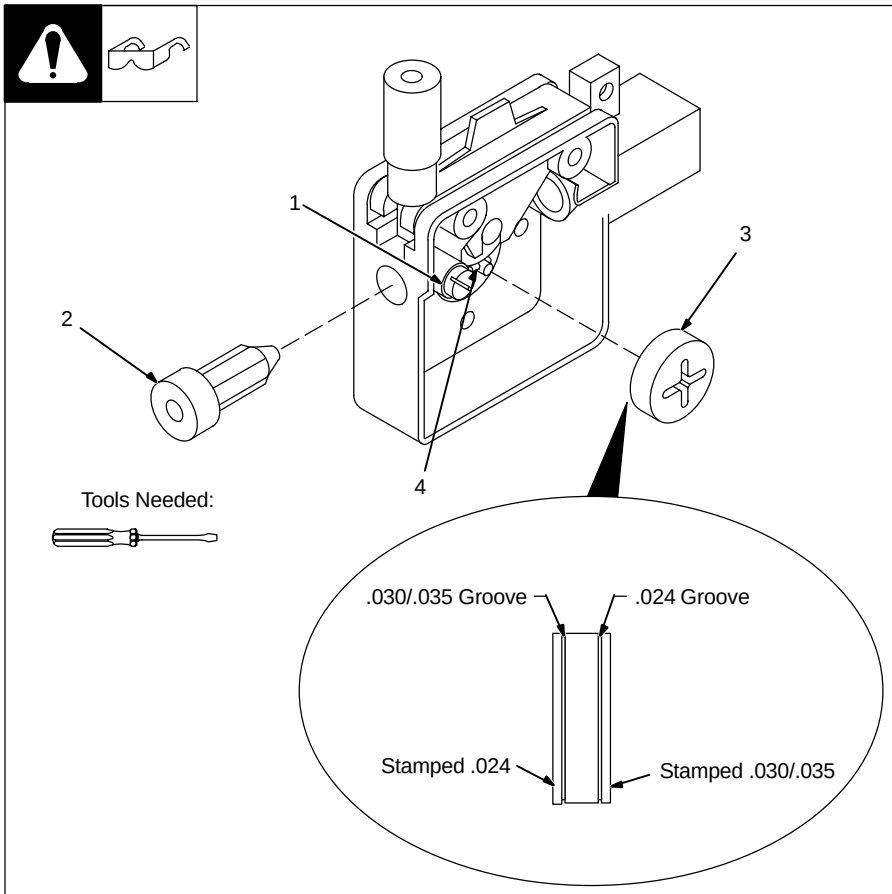


802 441

7-3. Drive Motor Protection

Drive motor protection circuit protects drive motor from overload. If drive motor becomes inoperative, release gun trigger and wait until protection circuit resets allowing drive motor to feed wire again.

7-4. Changing Drive Roll Or Wire Inlet Guide



1 Inlet Wire Guide Securing Screw

2 Inlet Wire Guide

Loosen screw. Slide tip as close to drive rolls as possible without touching. Tighten screw.

3 Drive Roll

The drive roll consists of two different sized grooves. The stamped markings on the end surface of the drive roll refers to the groove on the opposite side of the drive roll. The groove closest to the motor shaft is the proper groove to thread (see Section 3-10).

4 Retaining Pin

To secure drive roll, locate open slot and push drive roll completely over retaining pin, then rotate drive roll (1/4 turn) to closed slot.

Ref. 802 444-B

7-5. Replacing Gun Contact Tip

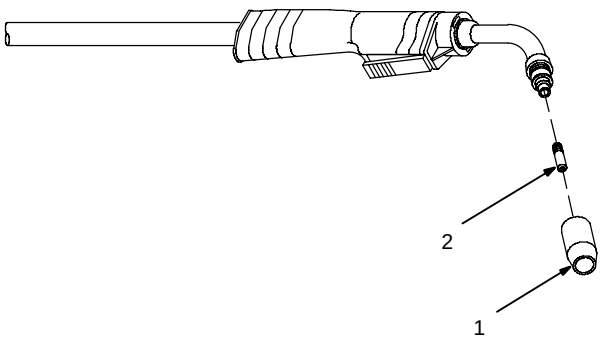
▲ **Turn Off power before replacing contact tip.**

1 Nozzle

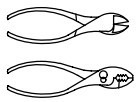
2 Contact Tip

Cut off welding wire at contact tip. Remove nozzle.

Remove contact tip and install new contact tip. Reinstall nozzle.



Tools Needed:

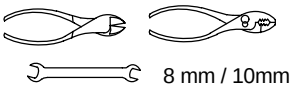


Ref. 802 399-A

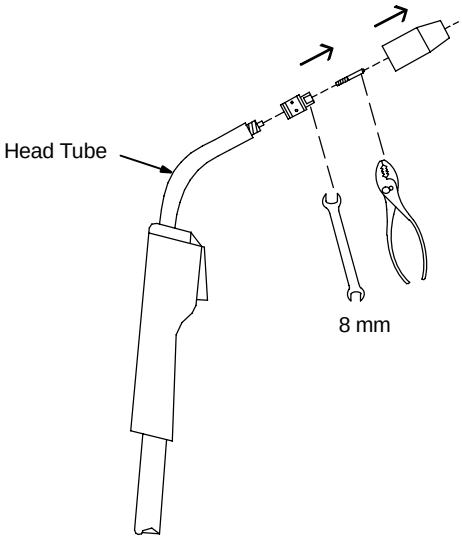
7-6. Cleaning Or Replacing Gun Liner

▲ **Disconnect gun from unit.**

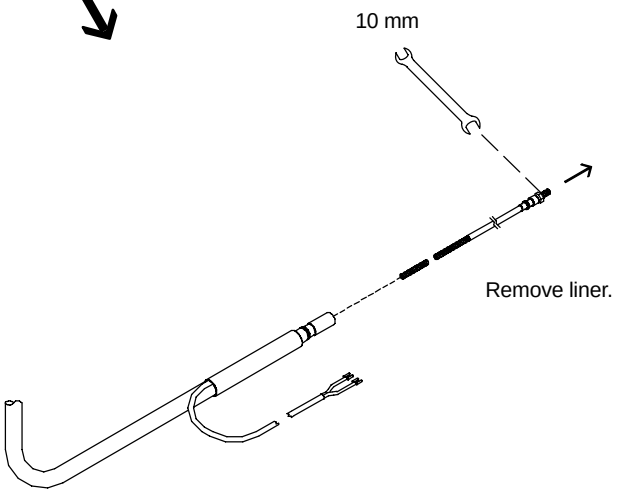
Tools Needed:



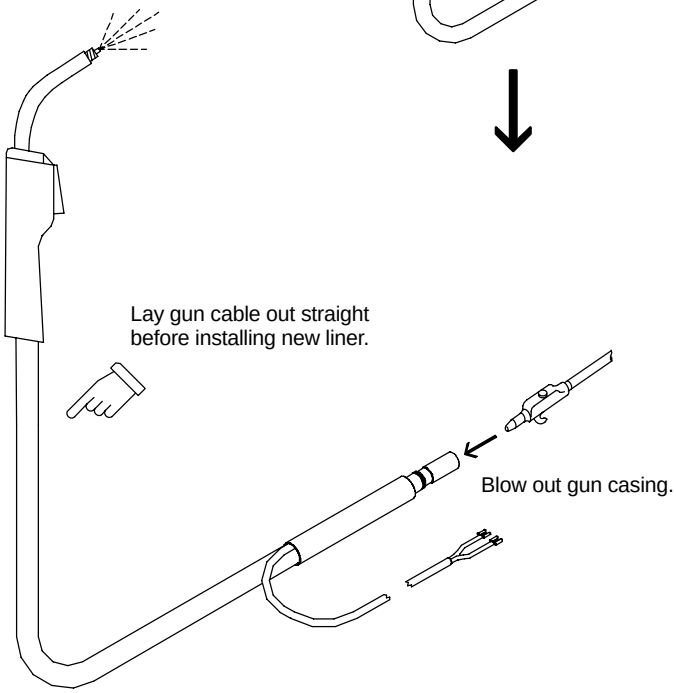
8 mm / 10mm



Remove nozzle, contact tip, adapter, gas diffuser, and wire outlet guide.



Remove liner.



Lay gun cable out straight before installing new liner.

Blow out gun casing.

To Reassemble Gun:

Insert new liner.

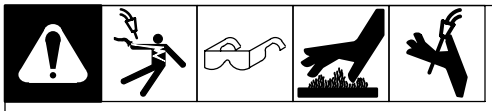
Install wire outlet guide so that 1/8 in (3 mm) of liner sticks out. Hand tighten outlet guide, and then tighten two full turns more.

Cut liner off so that 3/4 in (19 mm) sticks out of head tube.

Install gas diffuser, adapter, contact tip, and nozzle.

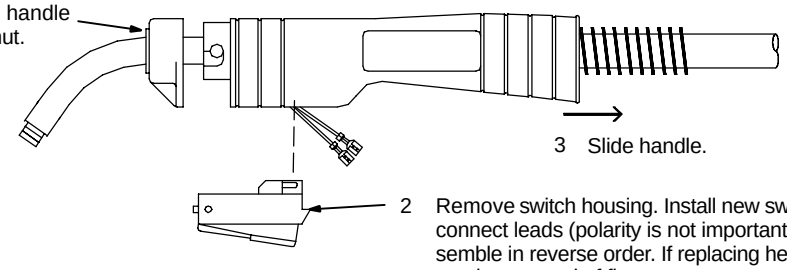
Ref. 802 446

7-7. Replacing Switch And/Or Head Tube



▲ **Turn Off welding power source /wire feeder and disconnect gun.**

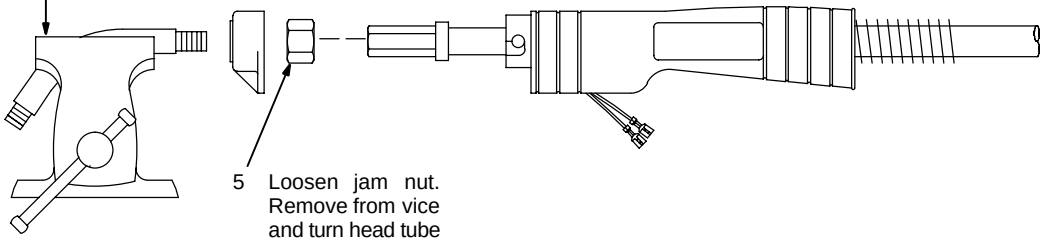
1 Remove handle locking nut.



3 Slide handle.

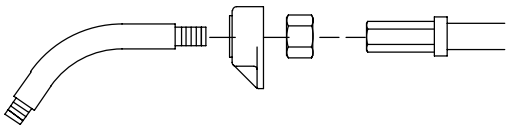
2 Remove switch housing. Install new switch and connect leads (polarity is not important). Reassemble in reverse order. If replacing head tube, continue to end of figure.

4 Secure head tube in vice.

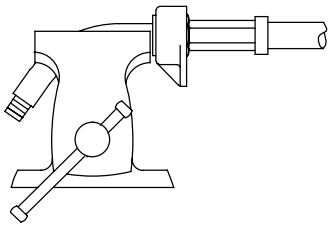


5 Loosen jam nut. Remove from vice and turn head tube out by hand.

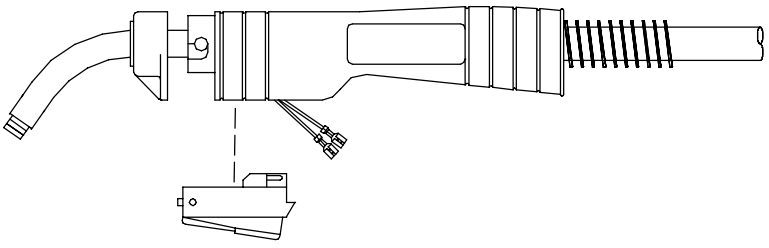
6 Hand-tighten head tube into cable connector.



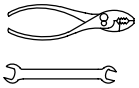
7 Place head tube in vice and tighten until nuts are tight.



8 Remove from vice. Reposition handle and install switch housing. Secure with handle locking nut.



Tools Needed:



19 mm

Ref. ST-800 795-C

SECTION 8 − ELECTRICAL DIAGRAMS

☞ *The circuits in this manual can be used for troubleshooting, but there might be minor circuit differences from your machine. Use circuit inside machine case or contact your distributor for further information.*

Model	Serial Or Style Number	Circuit Diagram	Wiring Diagram
115 VAC Model	KK213350 and following	194 324-C	196 637-A
230 VAC Model	KK213350 and following	194 325-A	196 655-A
Circuit Board PC1 (115 VAC Model)	KK213350 and following	195 890	
Circuit Board PC1 (230 VAC Model)	KK213350 and following	195 891	

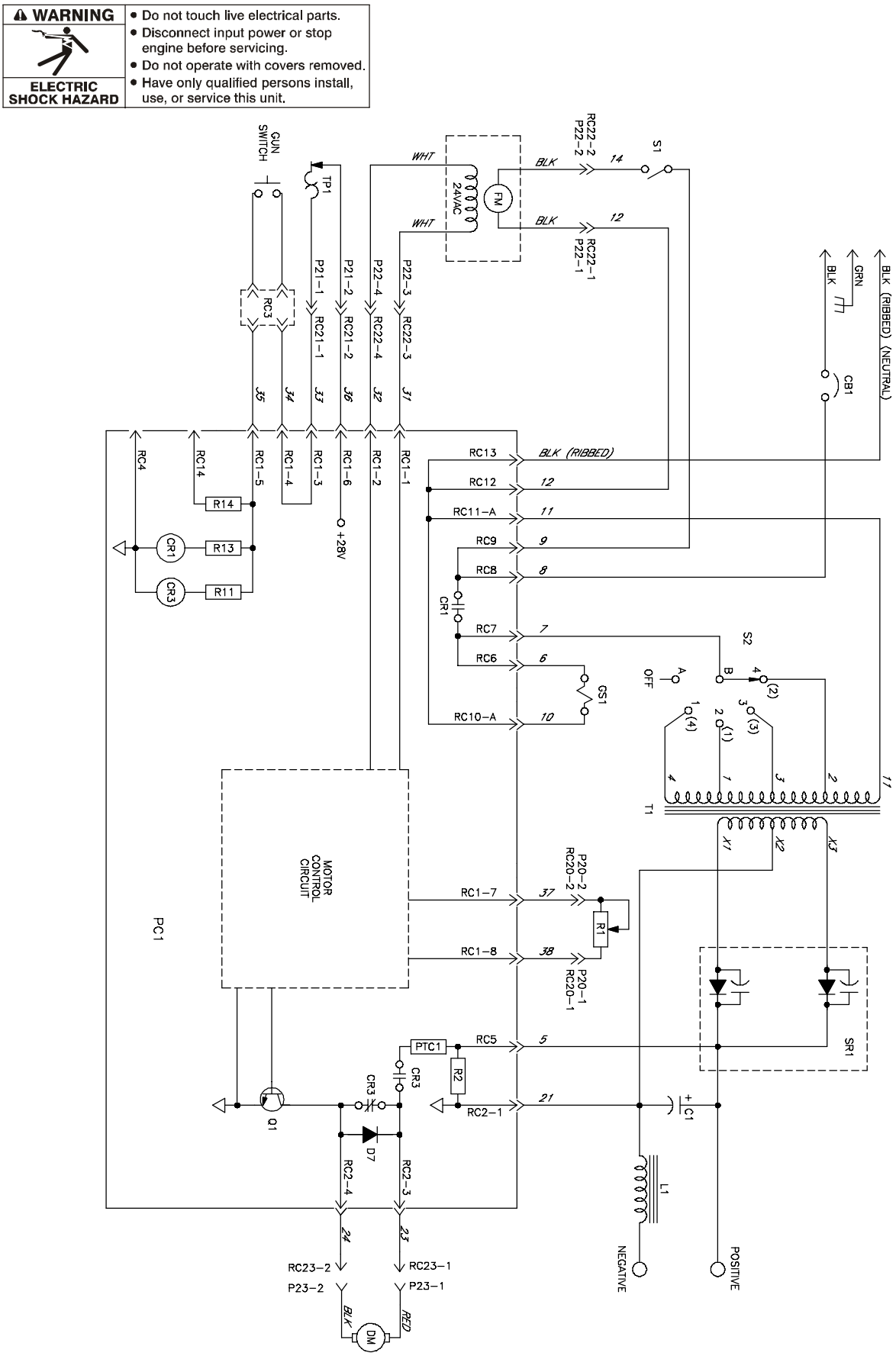
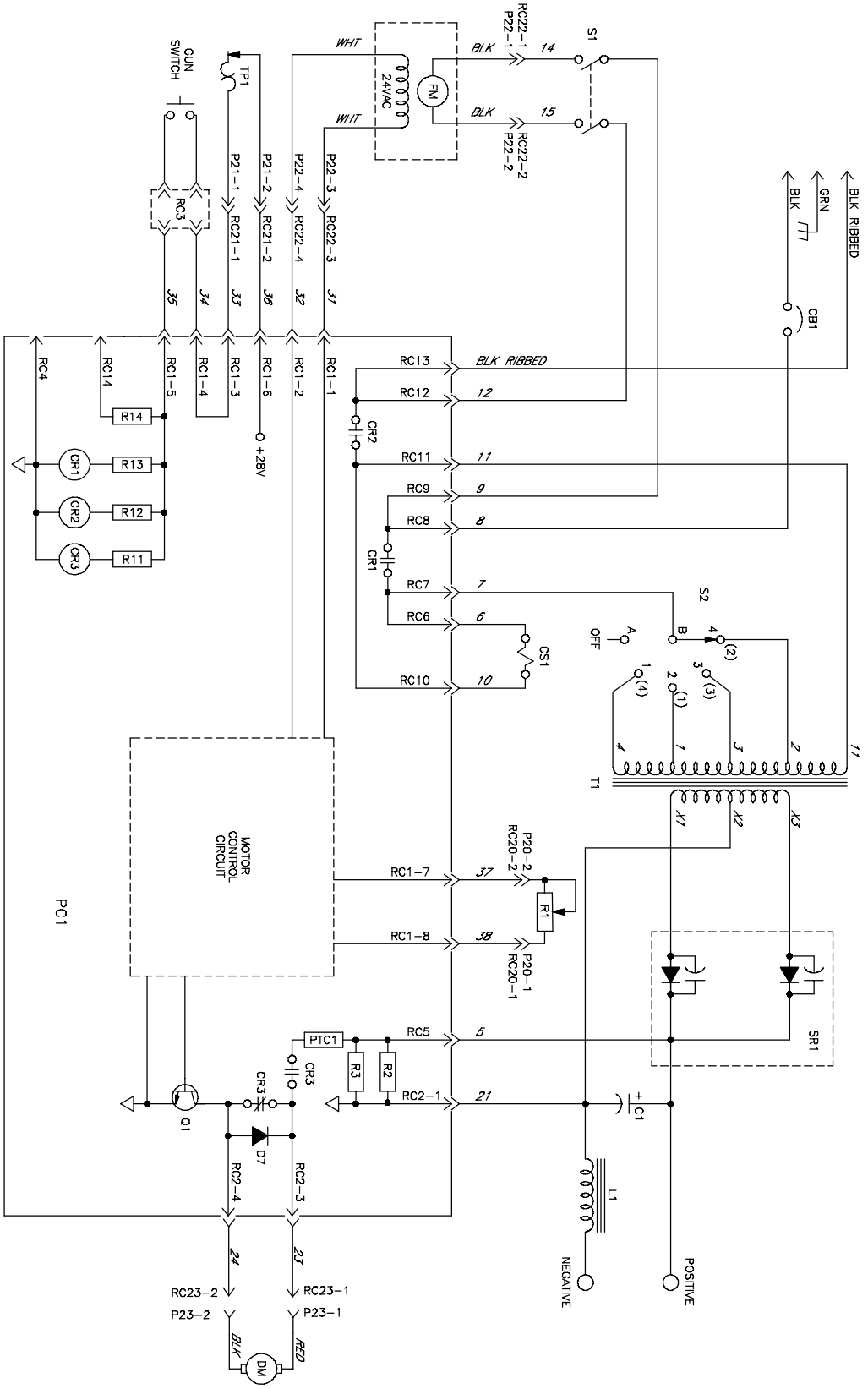


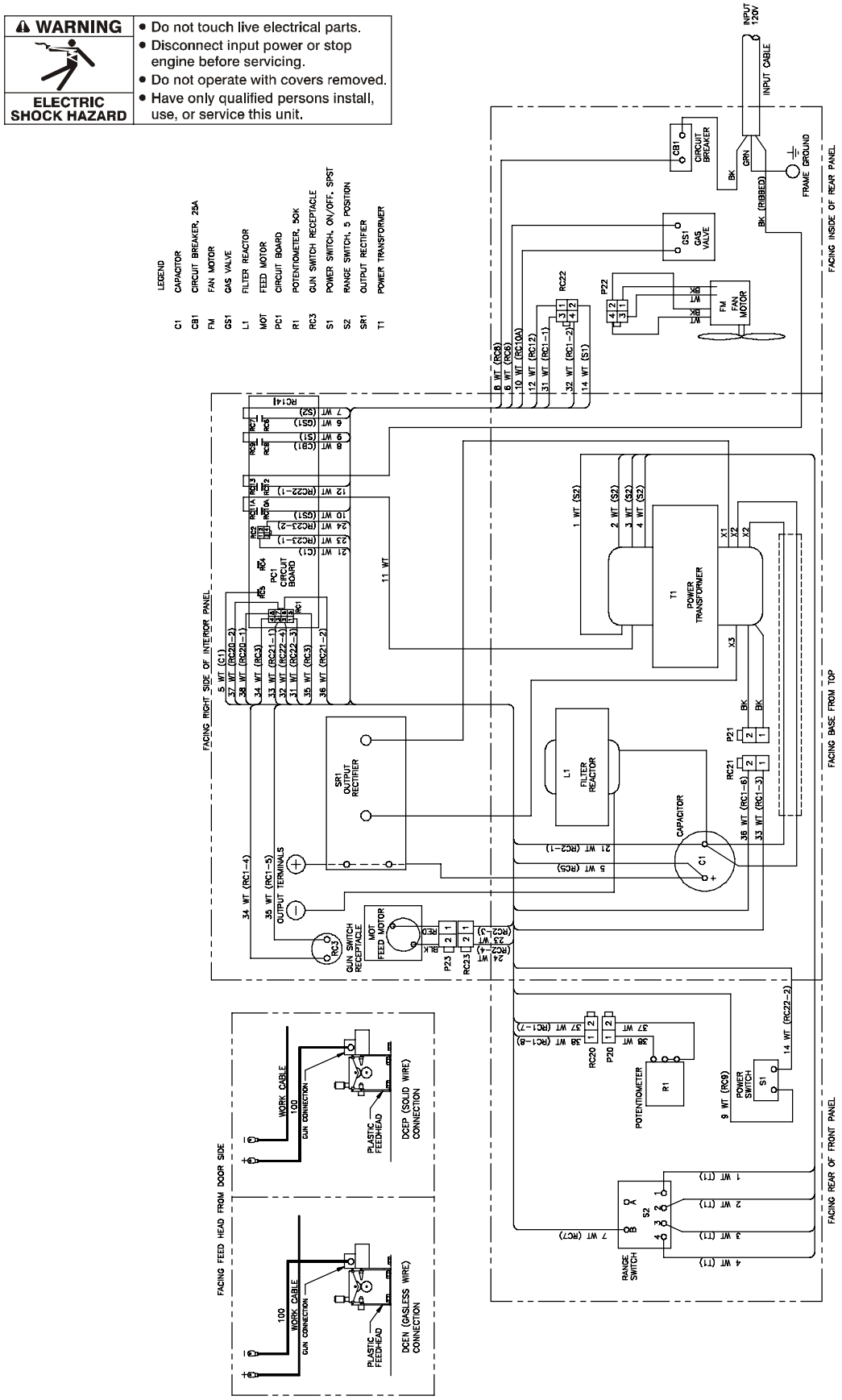
Figure 8-1. Circuit Diagram For 115 VAC Model Effective With Serial No. KK213350 And Following

⚠ WARNING	• Do not touch live electrical parts. • Disconnect input power or stop engine before servicing. • Do not operate with covers removed. • Have only qualified persons install, use, or service this unit.
ELECTRIC SHOCK HAZARD	



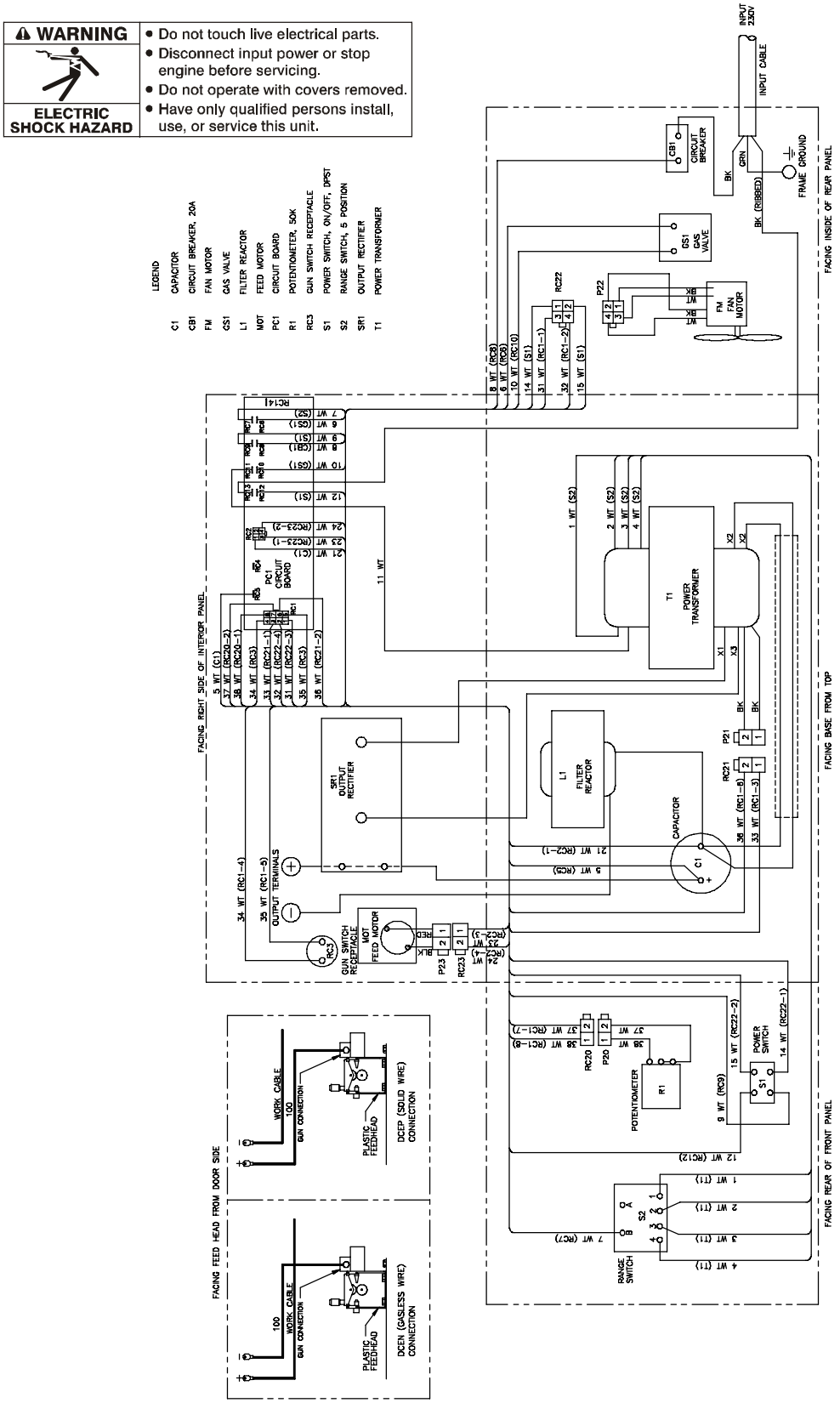
194 325-A

Figure 8-2. Circuit Diagram For 230 VAC Model Effective With Serial No. KK213350 And Following



196 637-A

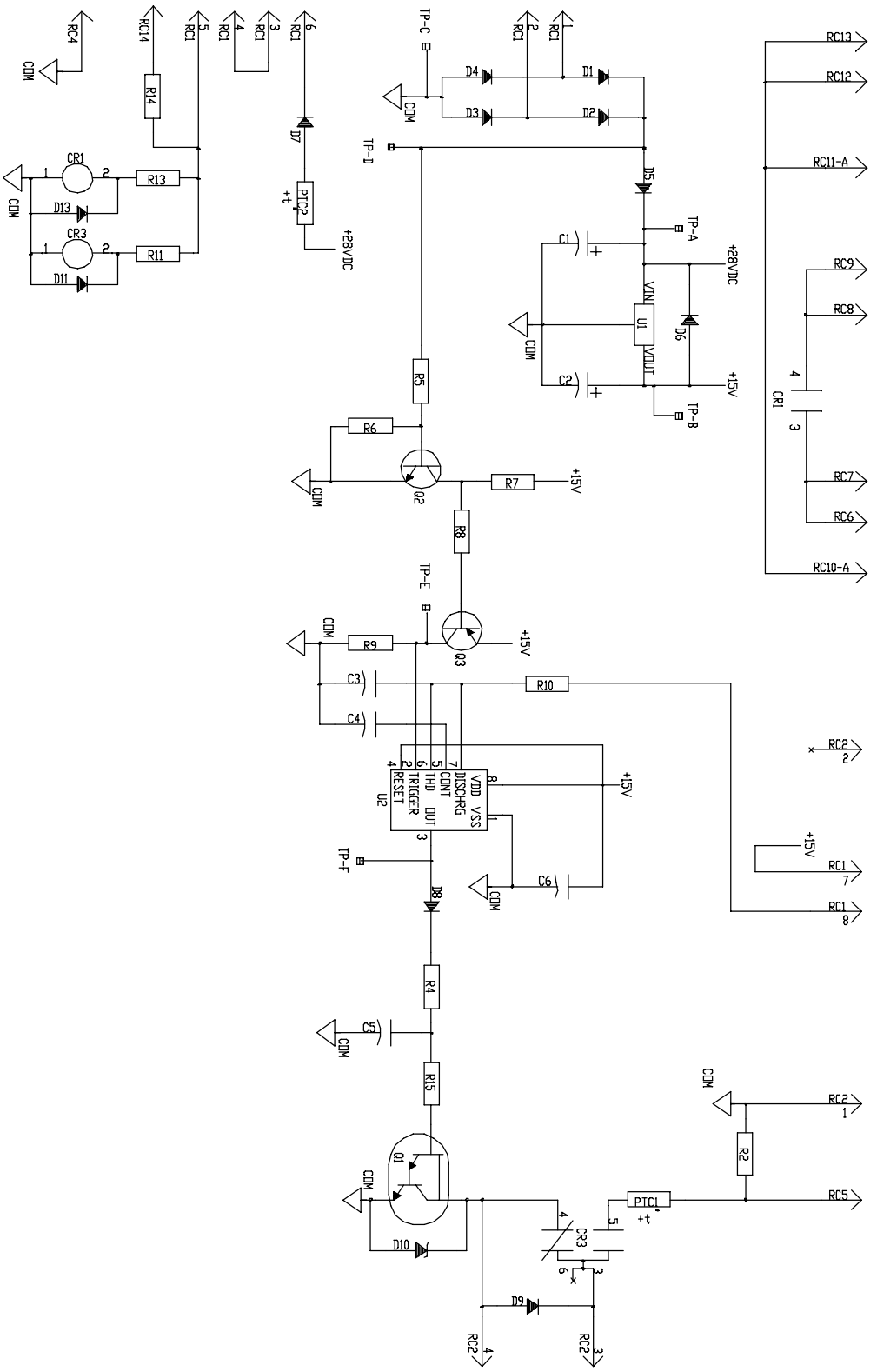
Figure 8-3. Wiring Diagram For 115 VAC Model Effective With Serial No. KK213350 And Following



196 655-A

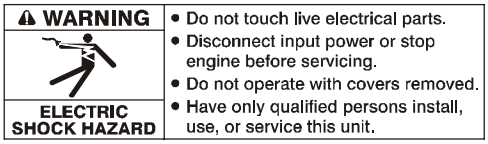
Figure 8-4. Wiring Diagram For 230 Model Effective With Serial No. KK213350 And Following

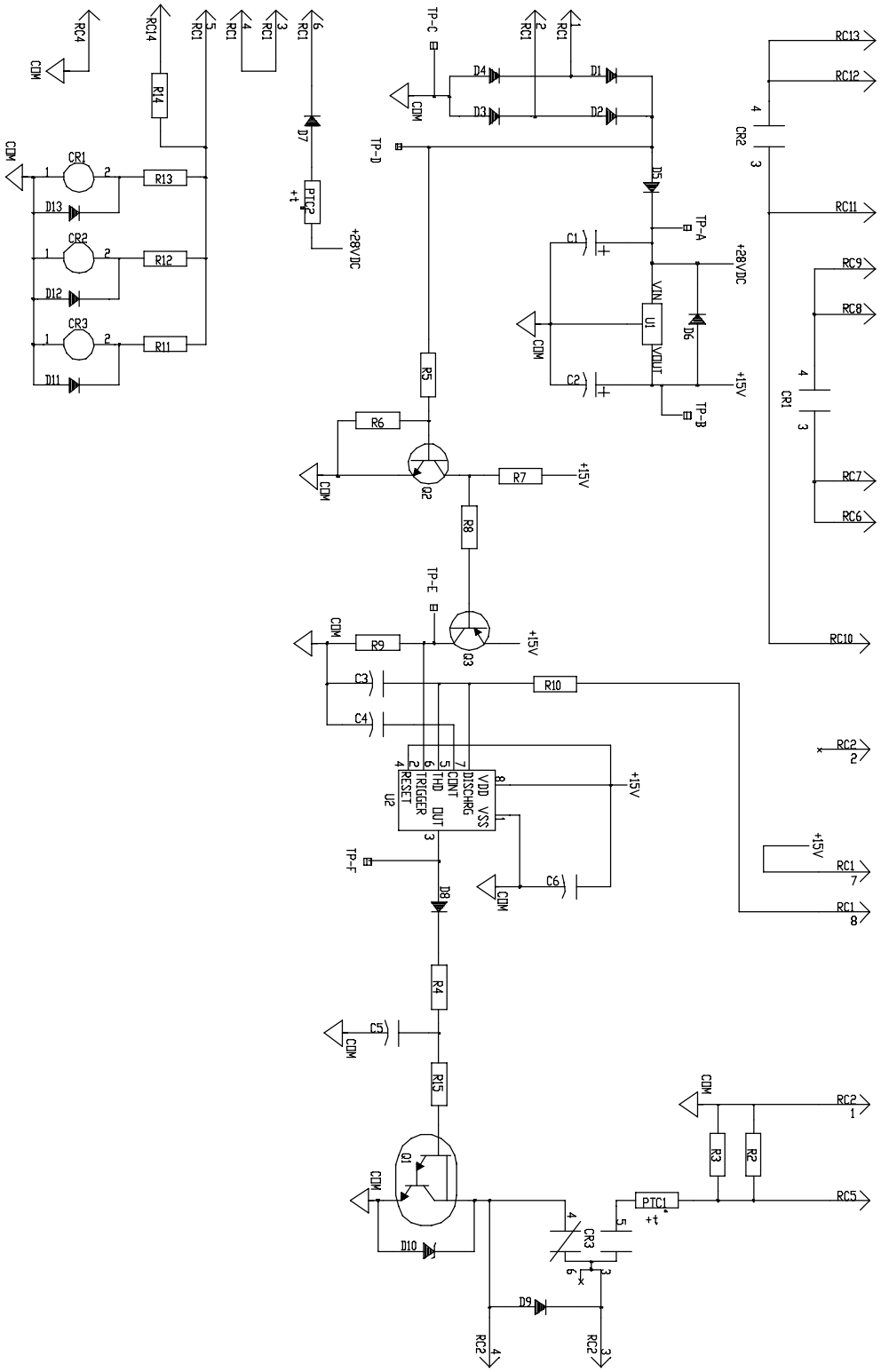
⚠ WARNING	• Do not touch live electrical parts. • Disconnect input power or stop engine before servicing. • Do not operate with covers removed. • Have only qualified persons install, use, or service this unit.
ELECTRIC SHOCK HAZARD	



195 890-A

Figure 8-5. Circuit Diagram For 115 VAC Model Control Board PC1
Effective With Serial No. KK213350 And Following


WARNING
ELECTRIC SHOCK HAZARD
• Do not touch live electrical parts.
• Disconnect input power or stop engine before servicing.
• Do not operate with covers removed.
• Have only qualified persons install, use, or service this unit.



195 891-A

Figure 8-6. Circuit Diagram For 230 VAC Model Control Board PC1
Effective With Serial No. KK213350 And Following

HOBART WELDERS

TM-944C October 2003

Handler 135 (500 414) Eff. w/Serial No. LB096205

Handler 175 (500 416) Eff. w/Serial No. LB075197

Processes

MIG (GMAW) Welding

Flux Cored (FCAW) Welding

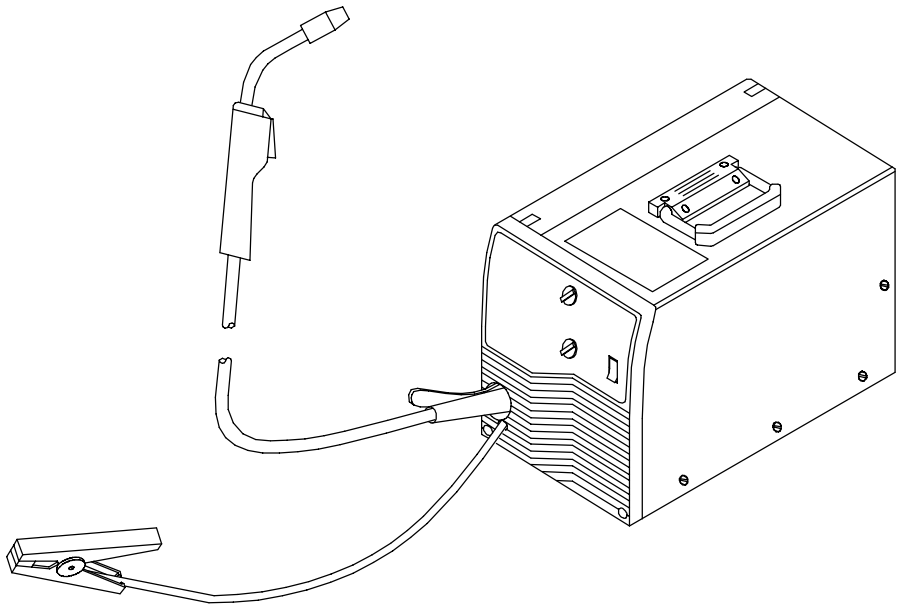
Description

CV DC 1 Phase

Arc Welding Power Source And Wire Feeder

Handler 135 / 175

And H-10 Gun



PARTS LIST

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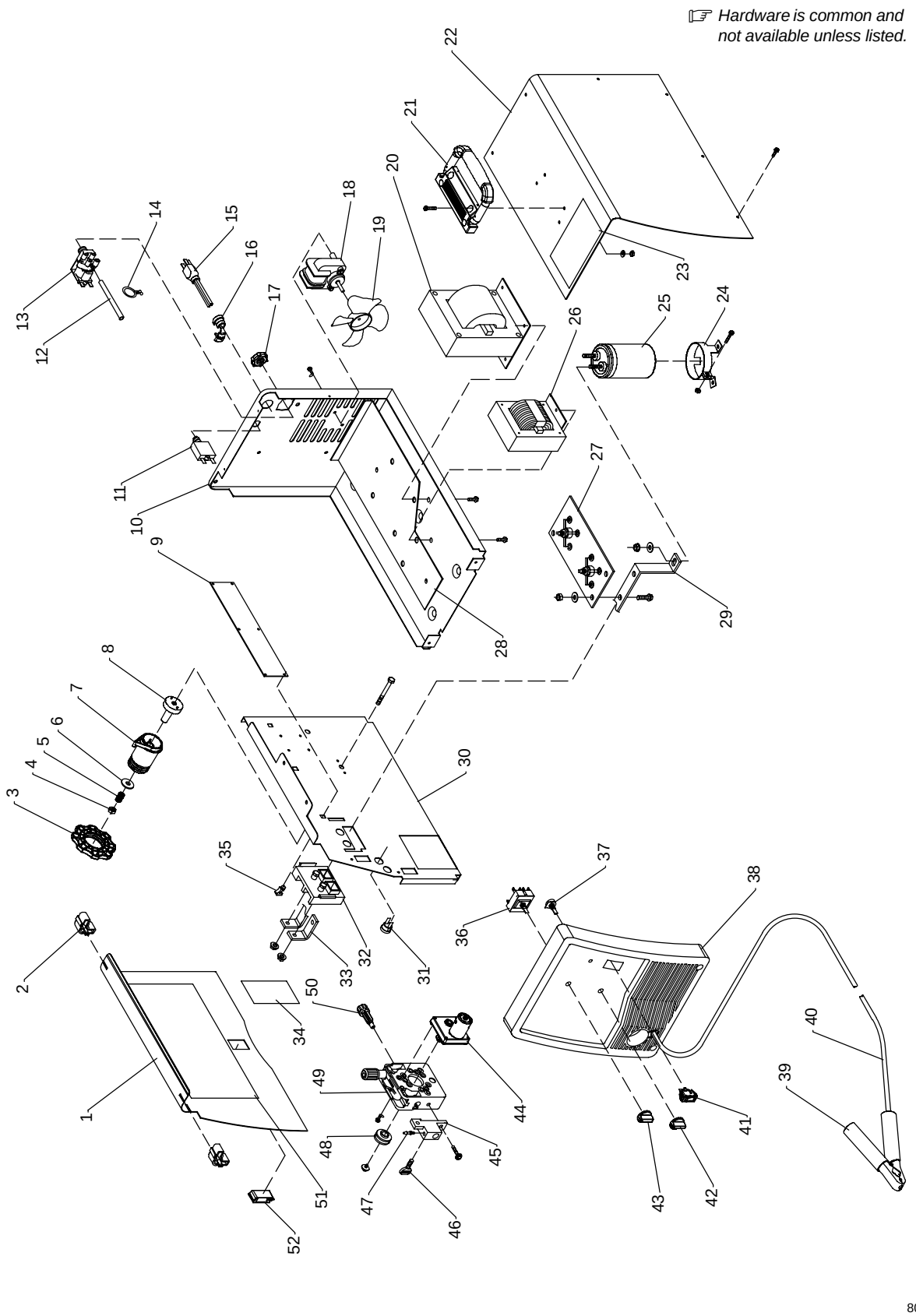

Figure 9-1. Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 9-1. Main Assembly

1		199 566	DOOR, access	1
2		196 006	HINGE, door	2
3		211 887	HUB, nut	1
4		204 608	NUT	1
5		202 998	SPRING, cprsn	1
6		203 072	WASHER, flat	1
7		211 339	HUB, spool	1
8		202 726	ADAPTER, spool hub	1
9		195 886	CIRCUIT CARD ASSY, control (115 VAC model)	1
9		195 887	CIRCUIT CARD ASSY, control (230 VAC model)	1
10		195 999	BASE, lower	1
11		210 109	CIRCUIT BREAKER, 25 amp	1
12		196 467	TUBING, PVC .187 ID x .312 OD x 24.000	1
13		116 996	VALVE, gas (115 VAC model)	1
13		128 751	VALVE, gas (230 VAC model)	1
14		197 198	CABLE TIE, .700-.799 bundle dia	2
15		147 545	CORD SET, 125V 5−15P 14GA 3/C 7ft SPT−3 jkt (115 VAC model)	1
15		152 118	CORD SET, 250V 6−50P 12GA 3/C 7ft SPT−3 jkt (230 VAC model)	1
16		111 443	BUSHING, strain relief	1
17		605 227	NUT, gas valve	1
18		196 063	MOTOR, fan (115 VAC model)	1
18		196 064	MOTOR, fan (230 VAC model)	1
19		409 953-001	BLADE, fan cooling	1
20		194 268	TRANSFORMER, power assy (115 VAC model)	1
20		194 277	TRANSFORMER, power assy (230 VAC model)	1
21		208 015	HANDLE, carrying	1
22		196 005	WRAPPER	1
23		204 036	LABEL, warning	1
24		203 491	CLAMP, capacitor	1
25		193 039	CAPACITOR, electlt 53000uf (115 VAC model)	1
25		193 040	CAPACITOR, electrlt 100000uf (230 VAC model)	1
26		203 868	REACTOR ASSY (115 VAC model)	1
26		203 874	REACTOR ASSY (230 VAC model)	1
27		193 191	RECTIFIER ASSY (115 VAC model)	1
27		193 316	RECTIFIER ASSY (230 VAC model)	1
28		198 585	PLATE, support (230 VAC model only)	1
		203 390	KEY, woodruff l (115 VAC model Prior to LC175022 or 230 VAC model Prior to LC155844)	1
29		193 193	BUS BAR (positive)	1
30		196 000	BAFFLE, center	1
31		405 576-001	BUSHING, terminal	1
32		193 144	INSULATOR, output stud	1
33		193 194	BUS BAR (negative)	1
34		199 824	LABEL, warning	1
35		134 201	STAND-OFF	1
36		409 477	SWITCH, rotary 25A 5 position	1
37		194 513	POTENTIOMETER,	1
38		196 129	PANEL, front (purple)	1
38		196 007	PANEL, front (black)	1
39		010368	CLAMP, work	1
40		196 619	CABLE, work	1
41		196 575	SWITCH, rocker SPST (115 VAC model)	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 9-1. Main Assembly (Continued)

. . . 41		196 574	. . SWITCH, rocker DPST (230 VAC model)	1
. . . 42		207 078	. . KNOB, pointer (WFS)	1
. . . 43		207 079	. . KNOB, pointer (voltage)	1
. . . 44		193 187	. . MOTOR, gear (115 VAC model Prior to LC175022 or 230 VAC model Prior to LC155844)	1
. . . 44		202 708	. . MOTOR, gear (115 VAC model Eff w/LC175022 or 230 VAC model w/ LC155844)	1
. . . 45		193 189	. . CONNECTOR, gun	1
. . . 46		196 654	. . SCREW, thumb	1
. . . . .		203 081	. . SCREW, feed roll (115 VAC model Prior to LC175022 or 230 VAC model Prior to LC155844)	1
. . . 47		196 009	. . FITTING, gas barbed	1
. . . 48		202 925	. . ROLL, feed .024 in, .030/.035 in	1
. . . 49		194 508	. . HEAD, feed assy	1
. . . 50		203 025	. . GUIDE, wire inlet	1
. . . 51		209 228	. . LABEL, weld chart (115 VAC model)	1
. . . 51		209 229	. . LABEL, weld chart (230 VAC model)	1
. . . 52		204 711	. . LATCH	1
. . . . .		♦212 492	. . REGULATOR/FLOWMETER, 10-50 CFH CO_2	1

♦OPTIONAL

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

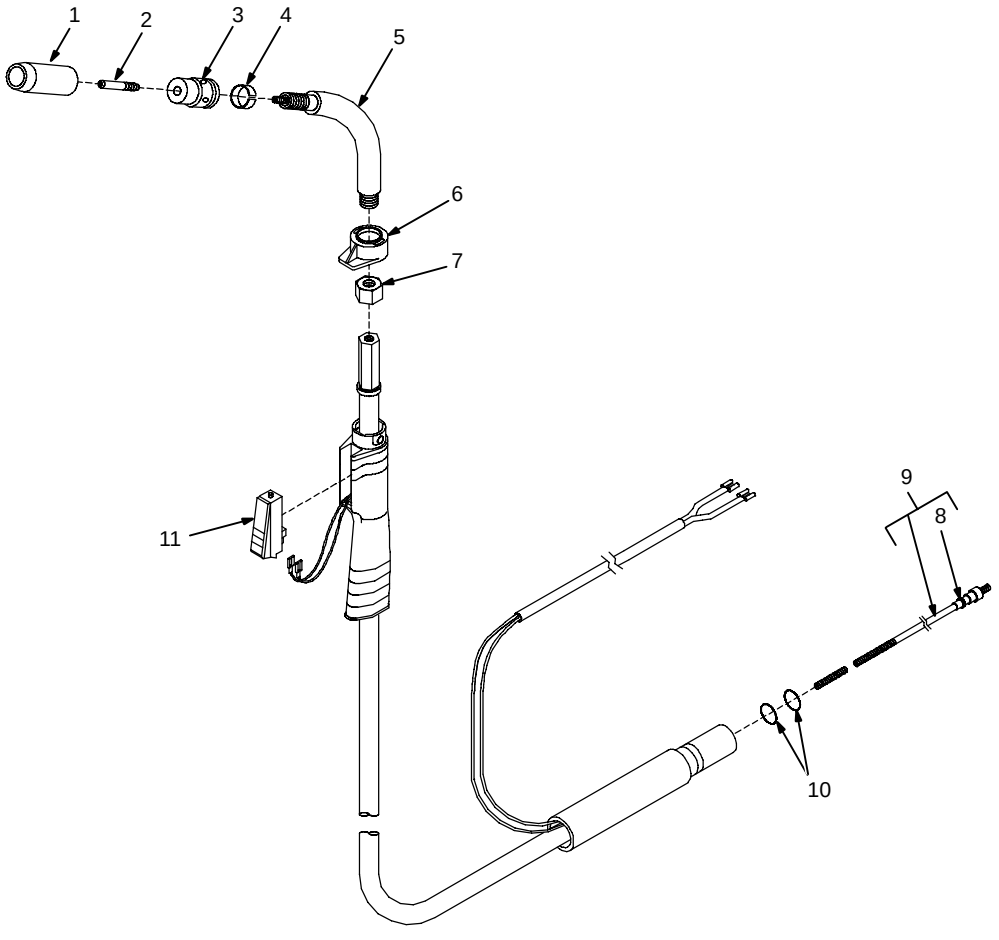

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Figure 9-2. H-10 Gun

Item No.	Part No.	Description	Quantity
	195 957	**Figure 9-2. H-10 Gun**	
1	169 715	NOZZLE, slip type .500 orf flush	1
2	♦087 299	TIP, contact scr .023 wire x 1.125	
2	♦000 067	TIP, contact scr .030 wire x 1.125	
2	♦000 068	TIP, contact scr .035 wire x 1.125	
2	♦000 069	TIP, contact scr .045 wire x 1.125	
3	169 716	ADAPTER, contact tip	1
4	170 470	RING, retaining	1
5	169 718	TUBE, head	1
6	169 738	NUT, locking handle	1
7	169 719	NUT, jam	1
8	079 975	O-RING, .187 ID x .103CS rbr	1
9	♦194 010	LINER, monocoil .023/.025 wire x 15ft (consisting of)	1
9	♦194 011	LINER, monocoil .030/.035 wire x 15ft (consisting of)	1
9	♦194 012	LINER, monocoil .035/.045 wire x 15ft (consisting of)	1
9	♦194 014	LINER, monocoil 4/64 AL wire x 10ft nyl(consisting of)	1
10	197 123	O-RING, .312 ID x .062 70 Dura BUNA-N	2
11	196 255	SWITCH, trigger	1

♦OPTIONAL

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

9-3. Optional Drive Rolls

For All Feed Head Assemblies	
PART NO.	**WIRE DIAMETER INCHES (mm)**
202 925	.024 (.6) and .030/.035 (.8 and .9)
202 926	.030/.035 (.8 and .9) and .045 (1.2 VK Groove)

9-4. Options

PART NO.	DESCRIPTION	REMARKS
770 187	Running Gear/Cylinder Rack	For One Small Gas Cylinder, 100 lb (45 kg)
194 776	Small Running Gear/Cylinder Rack	For One Small Gas Cylinder, 75 lb (34 kg)
195 957	H-10 Replacement Gun	10 ft length/.030-.035 wire size

NOTE: If individual parts are required, see Parts List chapter of this manual for part number to order.

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